

**INSTITUT BELGE DES SERVICES POSTAUX
ET DES TÉLÉCOMMUNICATIONS**

I B P T

**DÉCISION DU CONSEIL DE L'IBPT
DU 7 SEPTEMBRE 2011
CONCERNANT
LA CONFORMITÉ DU SYSTÈME DE COMPTABILISATION DES COÛTS DE
BELGACOM POUR 2009**

Version publique

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1 OBJET

La présente décision a pour objectif de publier une attestation de conformité du système de comptabilisation des coûts de Belgacom, conformément aux articles 62 § 4 et 64 § 2 de la loi du 13 juin 2005 relative aux communications électroniques (ci-après la loi du 13.06.2005).

2 RÉTROACTES

Par décisions du Conseil de l'IBPT, la mise en place d'un système de comptabilisation des coûts a été rendue obligatoire pour Belgacom en relation avec les marchés suivants :

	Marchés pertinents¹	Décisions de l'IBPT
1	Accès au réseau téléphonique public en position déterminée pour la clientèle résidentielle	Décision du 19 juin 2006
2	Accès au réseau téléphonique public en position déterminée pour la clientèle non-résidentielle	Décision du 19 juin 2006
3	Services téléphoniques nationaux pour la clientèle résidentielle	Décision du 6 novembre 2008
5	Services téléphoniques nationaux pour la clientèle non-résidentielle	Décision du 6 novembre 2008
7	Ensemble minimal de lignes louées	Décision du 17 janvier 2007 ²
8	Services de départ d'appel	Décision du 11 août 2006
9	Services de terminaison d'appel	Décision du 11 août 2006
10	Services de transit	Décision du 11 août 2006
11	Fourniture en gros d'accès dégroupé	Décision du 10 janvier 2008 ³
12	Fourniture en gros d'accès à large bande	Décision du 10 janvier 2008 ⁴
13	Fourniture en gros de segments terminaux de lignes louées	Décision du 17 janvier 2007 ⁵

Le 2 août 2010, Belgacom a transmis à l'IBPT le cahier des charges définissant la mission du réviseur d'entreprises chargé d'effectuer l'audit du système de comptabilisation des coûts pour l'année 2009.

Le 19 janvier 2011, Belgacom a communiqué à l'IBPT la documentation intitulée « *Belgacom Regulatory Cost Model 2009* ».

Le 3 mars 2011, Belgacom a communiqué à l'IBPT les conclusions du réviseur d'entreprises, le rapport des travaux d'audit dans son intégralité et la description du système de comptabilisation des coûts 2009 destinée à être rendue publique.

Le 3 août 2011, un projet de décision a été communiqué à Belgacom pour consultation.

Le 25 août 2011, Belgacom a communiqué ses commentaires sur le projet de décision.

¹ Numérotés en concordance avec la Recommandation de la Commission du 11 février 2003 concernant les marchés pertinents de produits et de services dans le secteur des communications électroniques susceptibles d'être soumis à une réglementation ex ante conformément à la directive 2002/21/CE du Parlement européen et du Conseil relative à un cadre réglementaire commun pour les réseaux et services de communications électroniques.

² Compte tenu de la décision de réfection du 14 septembre 2010 visant à corriger la décision du 17 janvier 2007 concernant les analyses de marché relatives aux lignes louées.

³ Compte tenu de la décision de réfection du 2 septembre 2009 corrigeant la décision du 10 janvier 2008 concernant les marchés d'accès à large bande.

⁴ Compte tenu de la décision de réfection du 2 septembre 2009 corrigeant la décision du 10 janvier 2008 concernant les marchés d'accès à large bande.

⁵ Compte tenu de la décision de réfection du 14 septembre 2010 visant à corriger la décision du 17 janvier 2007 concernant les analyses de marché relatives aux lignes louées.

3 BASES JURIDIQUES

L'article 62 § 3 de la loi du 13 juin 2005 prévoit que « lorsque la mise en place d'un système de comptabilisation des coûts est rendue obligatoire, l'Institut publie une description de ce système qui comprend au moins les principales catégories regroupant les coûts et les règles appliquées en matière de comptabilisation des coûts. »

L'article 62 § 4 de la même loi prévoit que « lorsque le système de comptabilisation des coûts appliqué par l'Institut le rend nécessaire, le respect du système de comptabilisation des coûts est vérifié, aux frais de l'opérateur, par un réviseur d'entreprises agréé désigné par cet opérateur. L'Institut est tenu de publier chaque année une déclaration relative au respect du système, sur la base des conclusions du rapport du réviseur d'entreprises. »

L'article 64 § 2 de la même loi prévoit qu'un réviseur d'entreprises agréé désigné par l'opérateur vérifie, aux frais de cet opérateur, le respect des systèmes de comptabilisation des coûts, lorsque l'Institut souhaite contrôler les tarifs des utilisateurs finaux conformément à l'article 64 § 1^{er} et que l'Institut détermine les systèmes de comptabilisation de coûts nécessaires et appropriés que l'opérateur visé applique. L'Institut est tenu de publier chaque année une attestation de conformité de ces systèmes.

La décision de l'IBPT du 22 août 2007 a déterminé les conditions que Belgacom doit respecter dans la mise en œuvre de son système de comptabilisation des coûts. Ces conditions portent sur les principes généraux, la qualité de l'information, les règles d'allocation et d'évaluation, la documentation, la description et le contrôle du système de comptabilisation des coûts, ainsi que sur les délais à respecter.

4 CONFIDENTIALITÉ

A l'occasion de la consultation précédant l'adoption de la décision concernant la conformité du système de comptabilisation des coûts de Belgacom pour 2007, il est apparu que l'auditeur ne se conformerait pas aux normes d'audit en vigueur et aux recommandations de l'Institut des réviseurs d'entreprises s'il devait mentionner dans ses conclusions des risques non matériels. Dans la présente décision, l'Institut résume dès lors lui-même les principales remarques développées dans le rapport des travaux d'audit. Ce résumé étant considéré comme confidentiel par Belgacom et/ou par l'auditeur, il n'est pas reproduit dans la version publique, sans que cela ne constitue une reconnaissance, de la part de l'IBPT, du caractère effectivement confidentiel de ces informations. Les passages remplacés par la mention [passage considéré comme confidentiel par Belgacom ou par l'auditeur] ne remettent nullement en cause les conclusions de l'IBPT.

5 CONSTATATIONS DE L'IBPT

L'IBPT a vérifié que la mission confiée par Belgacom au réviseur d'entreprises était conforme aux prescriptions de la section 8.2 de la décision de l'IBPT du 22 août 2007, à savoir : vérifier la pertinence du périmètre des coûts et des recettes, vérifier le respect des exigences de base, vérifier l'application des règles d'allocation et d'évaluation et présenter à l'IBPT un rapport sur l'exécution de sa mission.

L'IBPT a constaté que la réalisation de l'audit avait été confiée par Belgacom à la société Ernst & Young Réviseurs d'Entreprises, enregistrée auprès de l'Institut des réviseurs d'entreprises sous le numéro B00160.

L'IBPT a constaté que le contenu de la documentation fonctionnelle et de la description publique du système de comptabilisation des coûts était conforme aux prescriptions des sections 6.3 (Règles à suivre et documentation à préparer) et 7 (Description du système de comptabilisation des coûts) de la décision de l'IBPT du 22 août 2007.

Conformément à la décision du 22 août 2007 (section 8.2.3), le réviseur d'entreprises doit vérifier que les règles d'allocations et de réévaluation appliquées correspondent bien à la documentation préparée par Belgacom et à la description du système de comptabilisation des coûts.

Compte tenu des informations mises à sa disposition par Belgacom et des procédures de contrôle exécutées, le réviseur d'entreprises a constaté notamment :

[passage considéré comme confidentiel par Belgacom ou par l'auditeur]

Sur base de l'opinion du réviseur d'entreprises, l'IBPT conclut que le système de comptabilisation des coûts de Belgacom satisfait, dans tous les aspects matériels, au cadre légal constitué par la loi du 13 juin 2005 et la décision de l'IBPT du 22 août 2007.

6 DÉCISION

Après avoir dûment considéré les points de vue des parties concernées, tels que ceux-ci sont exprimés dans leur correspondance ou lors de réunions d'une part, et d'autre part, les objectifs généraux du cadre réglementaire en matière de promotion de la concurrence, d'efficacité économique et de défense des intérêts des consommateurs, l'Institut adopte la décision suivante :

1. Le système de comptabilisation des coûts 2009 de la société Belgacom répond aux prescriptions de la décision de l'IBPT du 22 août 2007.
2. Les conclusions du réviseur d'entreprises ayant procédé à l'audit du système de comptabilisation des coûts de Belgacom pour l'année 2009 sont publiées en annexe à la présente décision.
3. La description du système de comptabilisation des coûts de Belgacom pour l'année 2009 est publiée sur le site Internet de l'Institut.

Axel Desmedt
Membre du Conseil

Charles Cuvelliez
Membre du Conseil

Catherine Rutten
Membre du Conseil

Luc Hindryckx
Président du Conseil

Voies de recours

Conformément à la loi du 17 janvier 2003 concernant les recours et le traitement des litiges à l'occasion de la loi du 17 janvier 2003 relative au statut du régulateur des secteurs des postes et télécommunications belges, vous avez la possibilité d'interjeter appel de cette décision devant la Cour d'appel de Bruxelles, Place Poelaert 1, B-1000 Bruxelles. Les recours sont formés, à peine de nullité prononcée d'office, par requête signée et déposée au greffe de la Cour d'appel de Bruxelles dans un délai de soixante jours à partir de la notification de la décision ou à défaut de notification, après la publication de la décision ou à défaut de publication, après la prise de connaissance de la décision.

La requête est déposée au greffe de la juridiction d'appel en autant d'exemplaires qu'il y a de parties en cause. La requête contient, à peine de nullité, les indications de l'article 2, §2 de la loi du 17 janvier 2003 concernant les recours et le traitement des litiges à l'occasion de la loi du 17 janvier 2003 relative au statut du régulateur des secteurs des postes et télécommunications belges.

Annexe: conclusions du réviseur d'entreprises

Rapport de mission d'assurance indépendante relatif au système de comptabilisation des coûts établi par Belgacom SA de droit public pour l'exercice comptable 2009

A l'attention de monsieur Steven Tas
Vice-President Group Regulatory
Belgacom SA de droit public
Boulevard Roi Albert II, 27
1030 Bruxelles

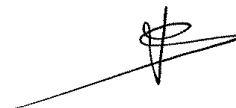
Nous avons l'honneur de vous faire rapport sur l'exécution du mandat qui nous a été confié par la société Belgacom SA de droit public ("Belgacom SA") dans le cadre du contrôle de ses obligations légales relatives au système de comptabilisation des coûts pour l'allocation des coûts actuels de l'exercice comptable clôturé au 31 décembre 2009. Ce système de comptabilisation des coûts est documenté par Belgacom SA dans le document ci-joint et authentifié "Belgacom Regulatory Cost Model 2009 - General Description" ("le Système de Comptabilisation des Coûts").

Mandat et responsabilités

Nous avons effectué le mandat de la mission d'assurance, concernant le contrôle des obligations légales relatives au Système de Comptabilisation des Coûts pour l'allocation des coûts actuels de l'exercice comptable clôturé au 31 décembre 2009, conformément au International Standard on Assurance Engagements (ISAE 3000).

Nous avons utilisé comme cadre référentiel pour notre mission les décisions applicables de l'Institut belge des Services Postaux et des Télécommunications ("IBPT") ainsi que la législation applicable, notamment:

- Décision du Conseil de l'IBPT du 15 avril 2010 concernant les modalités de l'obligation de séparation comptable de Belgacom;
- Décision du Conseil de l'IBPT du 22 août 2007 concernant la mise en œuvre de l'obligation pour Belgacom SA de mettre sur pied un système de comptabilisation des coûts;
- Loi du 13 juin 2005 concernant la communication électronique.





Rapport de mission d'assurance indépendante relatif au système de comptabilisation de coûts établi par Belgacom SA de droit public pour l'exercice comptable 2009 (suite)

Ces décisions et lois sont utilisées en tant que critères ("le Cadre Légal") dans l'évaluation du Système de Comptabilisation des Coûts.

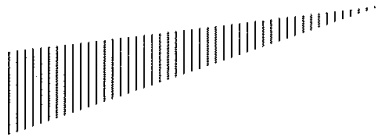
Ce mandat de mission d'assurance vise l'obtention d'un degré raisonnable d'assurance quant au respect du Cadre Légal susmentionné dans le Système de Comptabilisation des Coûts appliqué par Belgacom SA.

La mise en place du Système de Comptabilisation des Coûts relève de la responsabilité de Belgacom SA. Cette responsabilité comprend entre autres la conception et l'exécution des modèles de comptabilisation des coûts, afin de les faire satisfaire aux principes de causalité, d'objectivité, consistance et transparence tel que prescrit dans le Cadre Légal susmentionné.

Procédures réalisées

Notre mission est effectuée conformément au International Standard on Assurance Engagements (ISAE 3000), et en utilisant les critères tels que fixés dans le Cadre Légal susmentionné. Sur cette base, nous avons effectué les procédures que nous estimions nécessaires dans les circonstances pour obtenir une base solide pour notre conclusion. Nos procédures de jugements les plus importantes consistaient en:

- Effectuer un contrôle des regroupements des données comptables et valider la pertinence de ces regroupements;
- Effectuer, pour chaque étape d'allocation, un contrôle des montants financiers les plus importants, ainsi que d'autres montants choisis aléatoirement;
- Vérifier que les clés de répartition utilisées sont correctement calculées et appliquées;
- Vérifier que les données non financières servant au calcul des clés de répartition sont correctes et fiables;
- Vérifier les allocations effectuées sur base d'échantillonnages, notamment en contrôlant le caractère significatif des échantillons, ainsi que la méthode utilisée pour la détermination des facteurs de coûts;
- Vérifier les méthodologies relatives aux amortissements, au coût du capital et à l'évaluation des actifs;
- Vérifier le respect des décisions de l'IBPT et/ou les recommandations formulées lors des précédents audits;
- Vérifier que les règles d'allocation et de réévaluation appliquées correspondent bien à la documentation préparée par Belgacom SA et à la description du système de comptabilisation des coûts;
- Evaluer si les règles utilisées pour allouer les coûts sont présentées à un niveau de détail suffisant pour faire apparaître clairement la relation entre les coûts et la tarification des éléments et des services de réseau.



**Rapport de mission d'assurance indépendante relatif au système
de comptabilisation de coûts établi par Belgacom SA de droit public
pour l'exercice comptable 2009 (suite)**

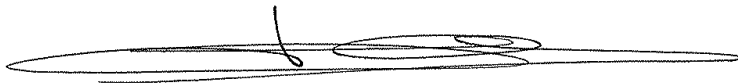
Conclusion

En vertu de nos travaux, nous concluons que le Système de Comptabilisation des Coûts satisfait, dans tous les aspects matériels, au Cadre Légal.

Ce rapport de mission d'assurance indépendante est établi dans le cadre des obligations de Belgacom SA de droit public dans le cadre de l'article 62 de la loi du 13 juin 2005 concernant la communication électronique, et ne peut être utilisé à d'autres fins.

Bruxelles, le 1 mars 2011

Ernst & Young Réviseurs d'Entreprises SCCRL
Représenté par



Marnix Van Dooren
Associé

Ref.: 11MVD0029

Belgacom Regulatory Cost Model 2009

General Description

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1 General description

Le département REG (Group Regulatory Affairs) assure la préparation des comptes séparés et opère le modèle d'élaboration des coûts sous-jacent à la production des coûts séparés et utilisé dans différents autres dossiers réglementaires. Conformément aux recommandations de la Commission Européenne, la totalité des coûts issus de la comptabilité générale (statutaire) est prise en compte dans le cadre de l'élaboration des comptes séparés et du modèle de coûts sous-jacent, à l'exception des comptes 65, 67 et des coûts des autres comptes écartés du périmètre. Les coûts utilisés dans l'exercice de modélisation sont directement issus du système SAP qui administre la comptabilité générale de Belgacom S.A. Les comptes statutaires ont fait l'objet d'un audit statutaire en 2010 effectué par Ernst & Young, Réviseurs d'Entreprises. Le collège des réviseurs d'entreprises a émis une attestation sans réserve des comptes annuels.

Les comptes séparés émanent des flux d'allocation de coûts réseau, IT et des flux ABC du système de comptabilisation des coûts de Belgacom, incluant le périmètre issu de la comptabilité générale ainsi que le coût du capital repris dans ces deux modules.

Le schéma suivant représente la structure du système de comptabilisation des coûts et mentionne les flux principaux. L'entièreté des éléments de coûts présents dans les flux est intégrée dans un logiciel (INCA) qui en effectuant des tests de validations empêche toute possibilité de double comptage ou d'attribution multiple.

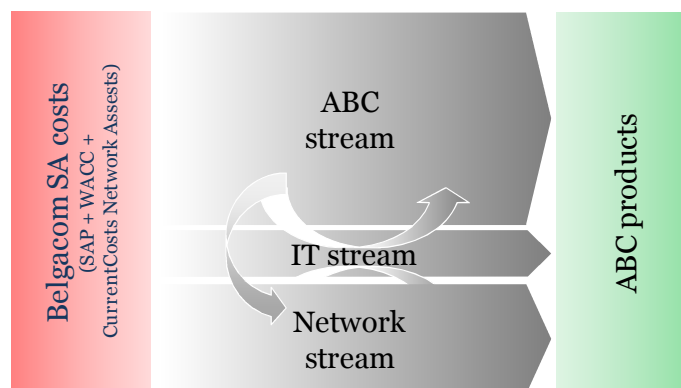


Figure 1

Les flux d'allocation de type ABC reprennent les coûts commerciaux et les autres coûts directs ou indirects qui ne sont pas repris dans les flux d'allocation « réseau » ni dans les flux « IT ».

Les flux « réseau » et les flux « IT » quant à eux, traitent tous les coûts en matière de réseau et de technologie de l'information, à l'exception de l'activité « End-User Support ».

Des ajustements liés au passage des coûts historiques aux coûts courants sont effectués pour les coûts des actifs du réseau et ont pour effet d'augmenter la base de coûts pris en compte dans le modèle de comptabilisation des coûts.

Faisant partie d'un seul et même modèle intégré et prenant leur source à une seule base de coûts, les flux d'allocation « ABC », « réseau » et « IT » sont vérifiés par l'outil de gestion de modèle

INCA assurant l'absence de double comptage et la traçabilité des données calculées jusqu'aux données du système SAP.

Le modèle d'élaboration des coûts de revient par produit suit l'approche "top-down".

2 Model Allocation Structure

This section provides the global view on the allocation structure of the model exhibiting the major allocation flows and introducing the major building blocks and concepts in the model. See Figure 2 and Figure 3 .

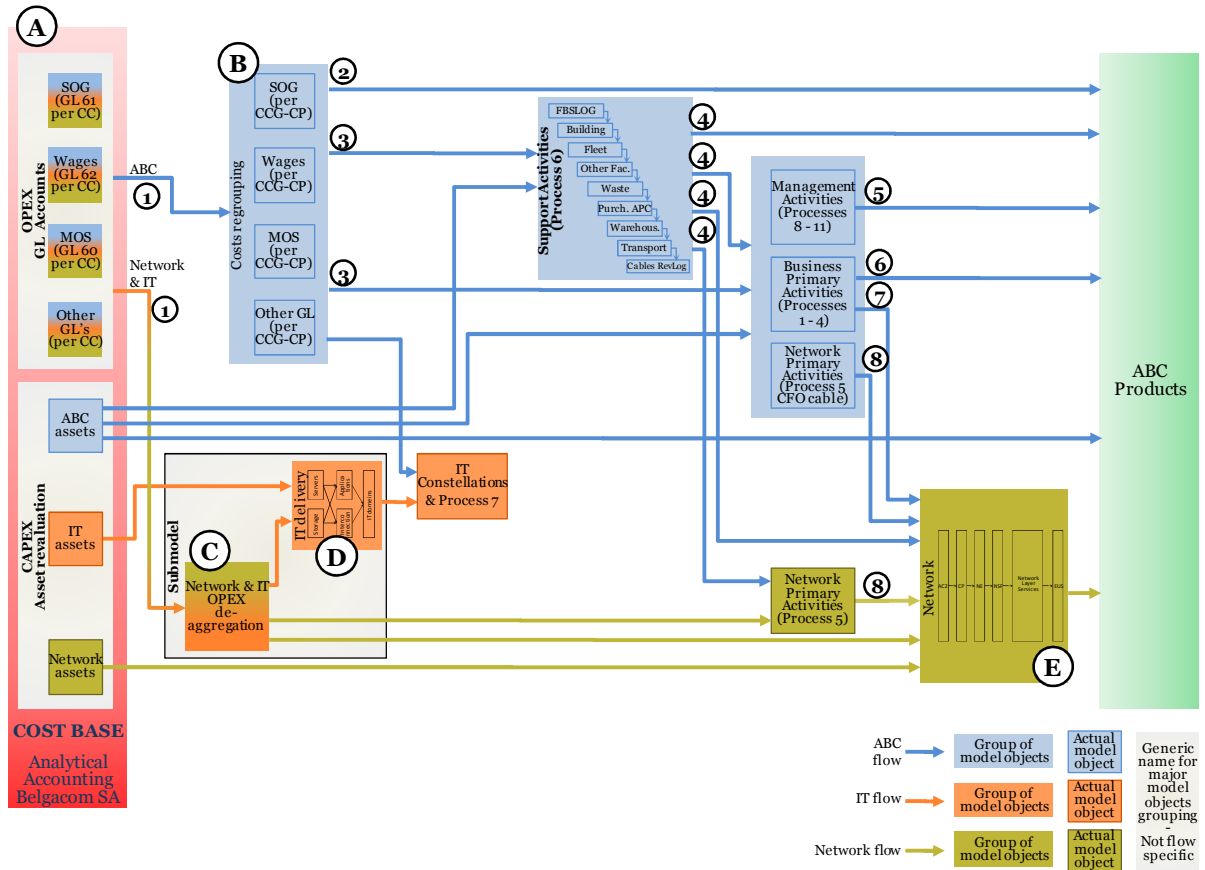


Figure 2: Graphic representation of the Belgacom Regulatory Cost Model 2009, without “IT constellations & Process7” allocations

Note: there is no relation between the size of the objects and the related costs or the complexity of the performed processing.

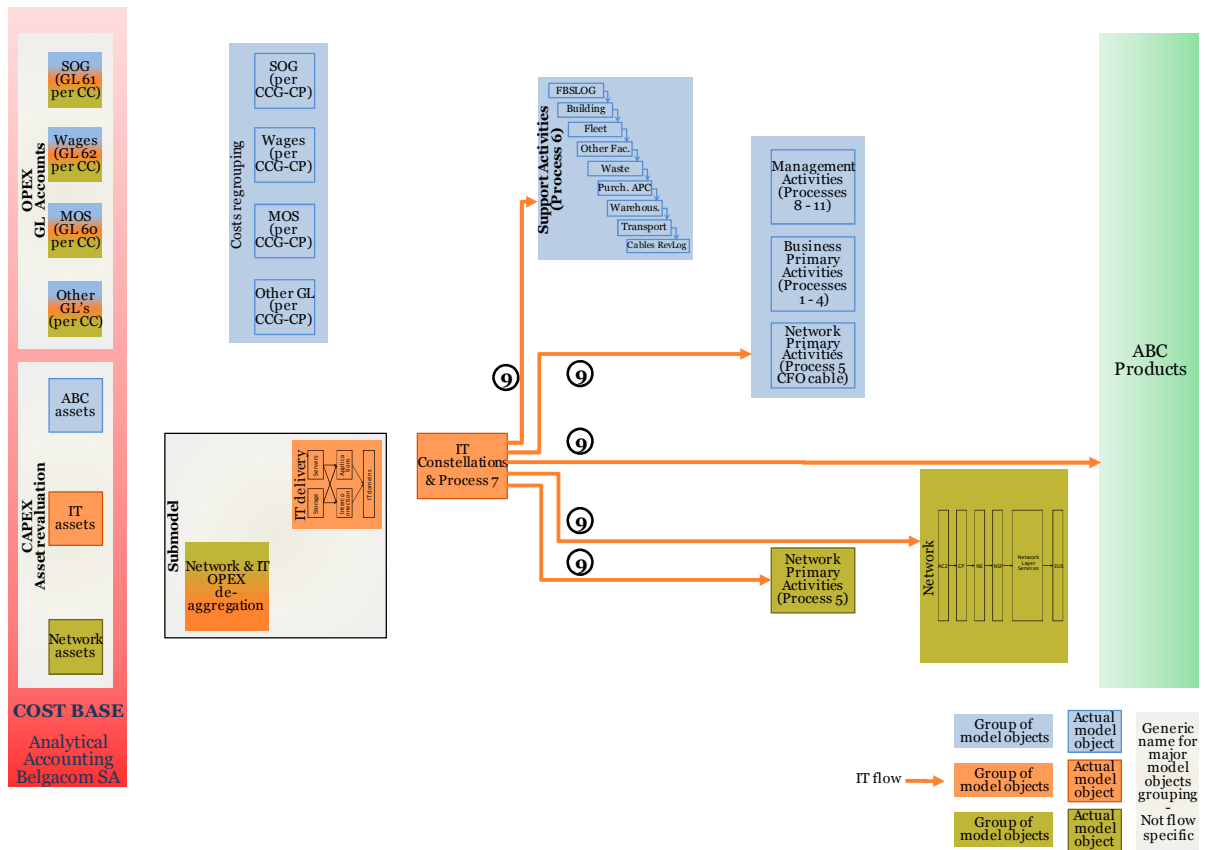


Figure 3: Graphic representation of the Belgacom Regulatory Cost Model 2009, only “IT constellations & Process7” allocations

Reference in scheme	Paragraph in document
A	3 Cost Base
B	4.1 Step1: Costs regrouping
C	5 Network&IT OPEX de-aggregation
D	6.1 IT delivery
E	7.1 A layered allocation model 7.2 From Assets to Network Stage Functions. 7.3 End User Services 7.4 Network services of the passive infrastructure layer : NLS1.0 7.5 Network services of the optical layer (NLS1.1-Services) 7.6 Network services of the transmission infrastructure 7.7 Network services of the packet based infrastructure 7.8 Network services of the IP infrastructure layer (NLS3-IP) 7.9 Network Services of the application layer
1	3.3 Répartition du périmètre des coûts entre le module ABC et le module Network /

	IT
2	4.2 Step 2: Allocating costs directly to the products
3	4.3 Step 3: Allocating costs to activities
4	4.4 Step 4: Allocation of the support costs
5	4.5.2 Allocation of the management activities.
6	4.5.1 Allocation of the business primary activities.
7	4.5.3 Allocation of the Network/CFO Cable activities
8	7.10 Allocation of Network Activities
9	6.2 Allocation of IT constellations

The overall objective of the model is allocating all the costs present in the cost base into the ABC products, products which have been defined by REG.

The cost base constitutes the starting point of the model and it is discussed in chapter 3 “Cost Base”.

Further, the model allocation process can be subdivided into three main streams, ABC, IT and Network, which can be clearly distinguished in the figure by its color code (see the legend in Figure 2).

The ABC stream has as objective to allocate all costs that are not part of the Network or IT streams towards the ABC products. This allocation flow can be divided in 5 steps:

- The first step consists of the process of regrouping all costs in, on the one side “cost pools” and on the other side “cost center groups”, as it will be explained under the paragraph 4.1 “Step 1: Costs regrouping” of this document.
- The second step consists of allocating certain costs directly to the products. See paragraph 4.2 “Step 2: Allocating costs directly to the products” for complete details.
- The third step consists of allocating the remaining costs to the activities, as detailed under paragraph 4.3 “Step 3: Allocating costs to activities”.
- The fourth step consists of allocating the support costs to either the primary activities, the management activities, the Network flow or directly to the products. Paragraph 4.4 “Step 4: Allocation of the support costs” describes this stage in detail.
- The fifth step consists of allocating the primary and management activities to the products. Refer to paragraph 4.5 “Step 5: Allocation of the primary and management activities to the products” for a comprehensive description.

The IT and Network streams, although having completely separated CAPEX basis, both share a common OPEX source since in the current organisation there are no specific cost centers for IT and non IT operational costs. Therefore, the first action to tackle is the distribution of these aggregated costs into their respective IT and Network components. Regarding the Network OPEX costs, this “Network&IT OPEX de-aggregation” stage also delivers a further division of the Network related OPEX costs into expenses contributing to “Network activities” and expenses directly attributable to

the Network. The detailed process followed to achieve such de-aggregation is explained on paragraph 5 “Network&IT OPEX de-aggregation”.

Once this distinction has been made, the IT and Network streams can be dealt with independently.

The IT stream, is made of two steps in the model:

- The IT delivery module processes the IT specific CAPEX and OPEX costs and distributes them into the IT constellations. The full description of this step can be found under the paragraph 6.1 “IT delivery”.
- The allocation of the IT constellations to the different products (and at some occasions to activities). See paragraph 6.2 “Allocation of IT constellations” for a comprehensive explanation on the subject.

The Network stream has also been squeezed into two main consecutive stages:

First, the allocation of the Network Primary Activities to the network objects (technology cost pools, network elements, network functions) presented in section 7.10, and secondly the allocation of the network objects following the logical network layers to network services and eventually to the ABC products elaborated in the Sections 7.1 to 7.9 .

In order to keep the allocation complexity (number of steps) within manageable limits , the implementation design of the model in the INCA tool encapsulates a portion of the allocation streams in a separated INCA submodel; only the end-to-end allocations relating to the encapsulated input objects to the encapsulated output objects are inserted in the remaining model allocations to form a smaller integrated model (also referred to as top-model).

3 Cost Base

3.1 Périmètre des coûts inclus dans le modèle

3.1.1 Coûts inclus dans le modèle

Les coûts inclus dans le modèle sont les comptes de charges opérationnelles, c'est à dire les comptes 60 à 64 de la comptabilité générale, ainsi qu'une partie des comptes 66 et 69.

Le compte 60 "achats de matériel" comprend principalement des achats de matériel télécom (modem ADSL, terminaux, câbles, cartes, mobiles, ...) et de fournitures (cpe, ...) et des variations de stocks.

Le compte 61 "services et biens divers" comprend principalement les charges liées au trafic (notamment les redevances d'interconnexion) et les charges de maintenance, d'énergie, de locations, de publicité, de représentation, de consultants, de déplacements.

Le compte 62 correspond aux charges de personnel.

Le compte 63 correspond aux dotations aux amortissements, aux provisions et aux réductions de valeur.

Le compte 64 regroupe les autres charges opérationnelles, parmi lesquelles se retrouvent principalement les éléments suivants : abandons de créances, taxes locales et précompte immobilier.

Le compte 66 reprend le montant de charges exceptionnelles correspondant au montant PBS (Pension Back Service) accepté par l'IBPT dans le cadre de l'offre BRIO.

Le compte 69 reprend le montant d'affectations et prélèvements correspondant à la participation du personnel dans le bénéfice de l'exercice (bonus collectif).

Par ailleurs, le compte 72 - "Production immobilisée" vient diminuer la base des coûts pour annuler les charges liées à la production immobilisée et éviter un double comptage avec les charges d'amortissements correspondantes.

Au périmètre issu de la comptabilité générale s'ajoute le coût moyen pondéré du capital (WACC) de 11,2% .

3.1.2 Coûts exclus du modèle

Les autres charges sont exclues du modèle. Il s'agit des comptes 65 à 69 de la comptabilité générale, excepté une partie des comptes 66 et 69.

Certaines charges sont exclues car considérées comme n'ayant pas de lien de causalité avec les produits et les activités. C'est le cas des charges exceptionnelles qui n'ont pas été reprises dans l'offre BRIO (compte 66) et des charges fiscales (comptes 67 et 68).

D'autres charges sont exclues du fait qu'elles sont déjà prises en compte dans le coût moyen pondéré du capital. Il s'agit des charges financières (compte 65) et des charges de dividendes (compte 69).

3.2 Organisation

Like in 2009 the Mobile business activities and Fixed Line activities were operated under separate legal entities (Mobile Carrier Services – MCS, Fixed Line Services – FLS), and the personnel from both entities was structured in a converged functional organisation. Costs of both entities are completely separated, and reported in separate accounting systems. For this model only the costs of Belgacom SA are concerned. In 2009 the organisation has been kept quite stable after the new organisation put in place in 2008. The only changes relate to the enlargement of the E-Business activity. In 2008 there was only one E-Business CCG within Sales whereas in 2009 a new department was created within Consumer Business Unit (CBU) named E-Business Services covering several CCG's. Also within Enterprise Business Unit (EBU) a new department was created named "Operational Excellence" and the COR/Large and SME market departments were reduced to COR and SME.

Also the activity "Investigators" moved within Staff and Support from Corporate Internal Services to Secretary General.

As a reminder, in January 2008 a complete new organisation was put in place in order to work more as an integrated Group and to propose to Customers always better convergence solutions. This new organisation is built in a matrix form meaning that some responsables will have an organisational (fixed-mobile) responsibility and a hierarchical responsibility in the originating company.

The organisational structure is laying upon 4 pillars:

- Consumer Business Unit (CBU) has the responsibility over the residential customers
- Enterprise Business Unit (EBU) has the responsibility over the professional customers
- Service Delivery Engine (SDE) centralises network and IT services
- Staff and support (S&S) groups all horizontal functions sustaining the Group activities

Although this is a complete new structure there was no impact on the costs for the Belgacom SA model as the subsidiaries kept their legal entity structure.

On October 1, 2008 there has been an integration of the Staff and Support personnel of Mobile, Telindus and Skynet meaning that involved personnel received a Belgacom contract and as such salary costs were in the Belgacom books of accounts. However re-invoicing was made for activities performed to these subsidiaries.

For information, find below the organisation as it was put in place on January 1, 2008:

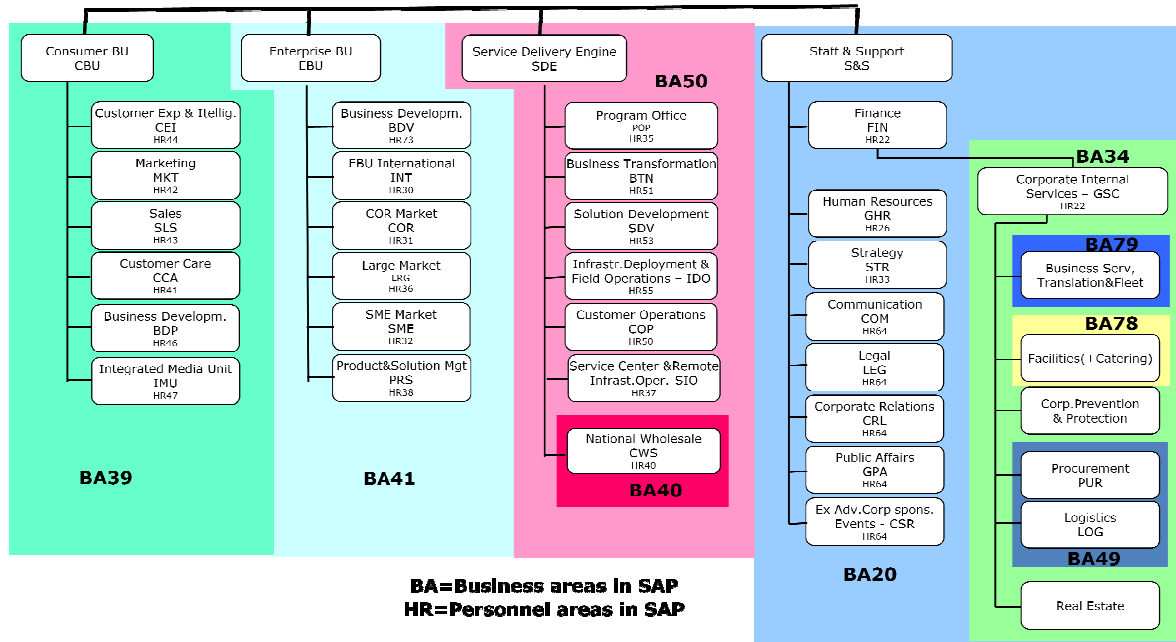


Figure 4

- This organisation re-introduces a clear split between the residential and professional customers by creating the division Consumer and Enterprise Business Units.
- The Service Delivery Engine brings together Network and IT services (formerly named ITN) , Customer Operations (COP), Program Office (POP) and Carrier Wholesale (CWS). The content of these blocks remains the same meaning that network and IT services are treated within the Network / IT flow whereas CWS, POP & COP are treated within ABC with the exception of COP costs for network cables that are Network / IT related.
- Within Staff & Support the content (FIN, GHR, STR, LEG, COM....) remains the same but a new department was created called Corporate Sponsoring and Events (CSR) grouping all sponsoring activities. Corporate Internal Services grouping internal services like Fleet, Facilities, Prevention&Protection, Procurement....fall under the responsibility of FIN, the Financial department.

3.3 Répartition du périmètre des coûts entre le module ABC et le module Network / IT

Le périmètre des coûts est réparti par le département REG entre des flux d'allocation de coûts réseau, IT et ABC en s'assurant que les données de coûts issues de SAP soient complètes et ne contiennent pas de doublons. Comme mentionné dans la description générale, le flux Network / IT alloue tous les coûts et investissements en matière d'informatique (à l'exception de l'activité « End-User Support ») et de réseau alors que le flux ABC alloue tous les autres coûts et investissements.

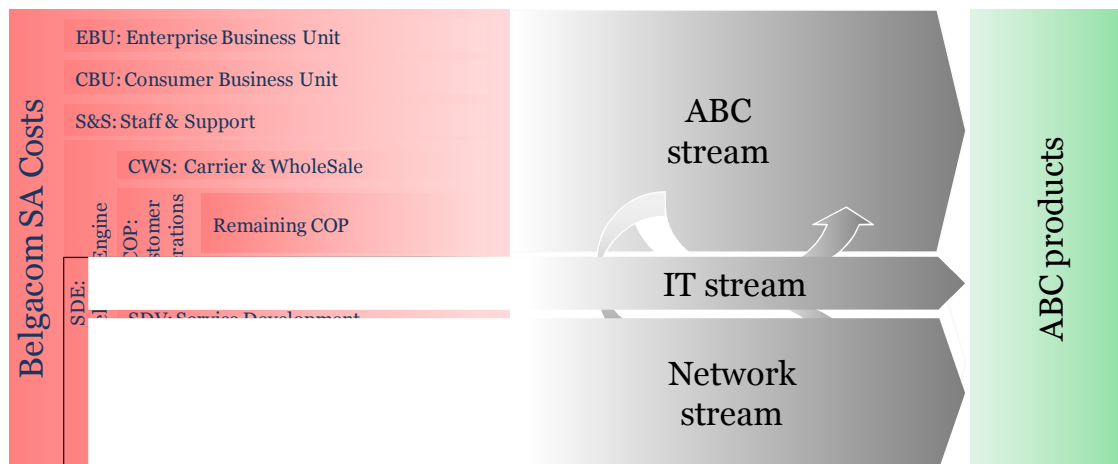


Figure 5

La répartition du périmètre des coûts entre les flux Network / IT et ABC est réalisée comme suit:

- The following departments within SDE are treated within the Network / IT flow: IDO (Infrastructure Deployment and Field Operations), BTN (Business Transformation), SDV (Solution Development), POP (Program Office) and SIO (Service Center & Remote Infrast. Operations) with the exception of Product Reference Data which is ABC related.
- Les coûts du département COP (Customer Operations) sont répartis entre les flux selon leur origine: les coûts relatifs à la construction et à l'entretien du réseau de câbles cuivres (les câbles fibre optique faisant partie de IDO donc du flux Network / IT) sont traités comme coûts Network tandis que tous les autres coûts de COP (activités client) sont traités comme coûts ABC. En règle générale, cette répartition est effectuée sur base d'une analyse des centres de coûts de COP. Certains centres de coûts, appelés centres de coûts « mixtes » (principalement management & support staff, operational excellence, field area management), comprennent à la fois des coûts réseau (Network / IT) et des coûts client (ABC) et une analyse plus détaillée est alors nécessaire:

Le matériel est réparti entre les flux ABC et Network / IT sur base des cost pools (matériel réseau = Network / IT, autre matériel = ABC).

Les réductions de valeur sur stock sont réparties entre les flux ABC et Network / IT sur base des classes de stock sous-jacentes tandis que les réductions de valeur sur créances relatives à des dégâts causés ou changements demandés par des tiers à l'infrastructure réseau sont traitées par le flux Network / IT.

- Les provisions relatives aux taxes sur équipements télécom qui sont enregistrées au niveau de SDE Mgmt sont réparties entre les flux sur base des classes d'actifs sous-jacentes.
- All other costs, not mentioned above are treated within the ABC flow namely the divisions CBU (Consumer Business Unit) and EBU (Enterprise Business Unit), CWS (Carrier Wholesale) and Staff & Support. The Staff & Support division comprises different departments: STB (Services to Business) includes Headquarters, Legal, CSR (Corporate Sponsoring and Events), COM, Public Affairs, Secretary General and CRL (Corporate Relations). Then we have departments like Finance, Group Human Resources, Strategy and

finally GSC (Corporate Internal Services) for departments like Real Estate, Business Services, Facilities, Prevention & Protection, CSM (Corporate Sourcing & Supply Change).

- En ce qui concerne les investissements (amortissements et coût moyen pondéré du capital), la répartition entre les flux ABC et Network / IT est effectuée sur base d'une analyse des classes d'actifs: les actifs IT et réseau enregistrés au niveau de la division SDE sont traités dans le flux Network / IT tandis que tous les autres actifs (bâtiments, installations énergie, CPE,...) sont traités dans le flux ABC.

3.4 Assets revaluation

3.4.1 Network assets revaluation methods

3.4.1.1 *Methods used to reevaluate the network assets*

The regulatory framework clearly states that the cost accounting systems of operators being declared as dominant on relevant markets must be set based on Current cost accounting for the network costs.

The network & IT flows within the top down model 2009 calculate the current costs for the network related assets. Current costs have been computed as explained hereafter.

There are five methods to evaluate the current value of the network: reassessment of the current inventory, price indexation, by default "keep everything as it is", index based on a fixed PPC and, as described in a subsequent section, regulated cost price based. For old assets concerning technology still in service we use a new method based on a fixed PPC2007. Each of these methods requires its own set of inputs. It is mainly the availability (or lack) of input which dictates the choice of the method. Nevertheless each method has its advantages and disadvantages with respect to the others.

The inventory and price indexation methods assume that network departments replace the equipment of its assets by equivalent equipment. The notion of equivalent is quite fuzzy. An engineer would tell you that over time there are always more functions integrated in new equipment and that they are always more cost-effective. It makes the comparison between different generations of equipment difficult. The notion of equivalent has therefore been addressed through the term Modern Equivalent Asset (MEA). The assets must be replaced by their MEA. The MEA is the replacement cost of the technology expected to be in place within the planning horizon. Note that this notion takes into account the introduction speed of a new technology in the network. If network departments plan to have replaced 50% of an old technology by a new one within the planning horizon, it makes no sense to simulate the costs with higher percentages because the planning takes into account the availability of the resources to carry out the work.

Find hereafter the rules that have been used:

- Technology still in procurement: use current price, e.g. SDH equipment, DWDM equipment

- Technology to be replaced within the planning horizon: use current price of the modern equivalent asset, e.g. some PDH line system equipments are replaced by SDH equivalents.
- Obsolete technology: use current price of the modern equivalent asset, e.g. the HDSL technology for high speed services on copper replaces the less cost-effective HDB3 technology.
- Technology grouped in : those assets will be revaluated by another asset concerning the same technology
- Old technology not anymore in service : those assets are set out of scope and will not be revaluated
- Old technology still in service (in maintenance mode) ; those assets are revaluated by an index method based on a fixed PPC instead of index or inventory method . Old assets revaluated by keep will keep the CAV value as GRC
- ATM technology : use the BIPT regulated cost price to value the switching component of asset .

3.4.1.1.1 Price Indexation

This is the most straightforward approach, provided historical costs are available. The investments for each year (from 1981 on) are multiplied by the price index of the year concerned. The price index is equal to the ratio of the current price to the historical price of the equivalent service/product.

The method is refined by defining price indexes depending on the nature of the cost. This is particularly true when costs of a different nature experienced a different price evolution. Three different types of price indices have been defined: the labour index, the indices for services delivered by external companies and the material index. Note that indices for services supplied by external companies vary according to the asset involved. For example, services supplied by external companies related to cable assets, are in fact outsourced labour costs for trenching and cable installation. In such case, a labour index has been applied. Other external services less labour intensive are resulting in other price indices, such as a fibre cable index.

3.4.1.1.2 Inventory

This is the best method to reflect accurately the price of assets currently in service in the network. The revaluation is merely performed by multiplying the volume of each specific type of equipment currently deployed in the network by its average current unit cost. The current unit costs are based on the prices defined in the current frame agreements we have with our suppliers.

In terms of inputs it is the most demanding method. It requires an extensive inventory of equipment.

The inventory method has been used for data, switching, transmission and access equipment. Switching data is based on the inventory reports delivered by the engineering service. Transmission

and access data are obtained from the technical database ITR. Data inventories are obtained from field operational tracking sheets.

3.4.1.1.3 Keep as it is.

The “keep as it is” method is merely what its name says. We keep the price we have in the historical accounting books. This method is only valid for costs with a very short depreciation period or for software intensive products. For the latter we assume that on the one hand software development is labour intensive but on the other hand the rapidly evolving programming environment improves the productivity compensating for the higher labour cost. This results in a stable software price. Another practical reason to select the “Keep as it is” method is the amount booked on the asset. If this amount is small, the method has also been applied. In this particular case, the effort to collect all the information about the cost evolution outweighs the impact on the service costs.

3.4.1.1.4 Index Based on a fixed PPC

Old technology still in service (in maintenance mode) ; those assets are revaluated by an index method based on a fixed PPC

If Belgacom has done some investments for keeping those technologies in service, we take those investments also into account.

□ Formula :

$$GRC_{yearN} = [(GRC_{yearN-1}) * (1 + fixedPPC\ 2007)] + investment\ sYearN$$

3.4.1.2 TAM: Tilted Annuity Method

3.4.1.2.1 Theory

The purpose of this section is to describe how the Tilted Annuity Method (TAM) is finally implemented in the Current Cost Accounting (CCA) based network cost model 2009.

As from the 2003 model, Belgacom implemented the formula that BIPT suggested.

$$ACC_{\mu Y} = F1, \mu Y \times F2, \mu Y$$

where

$$F1, \mu Y = (GRC_{\mu Y, begin} + GRC_{\mu Y, end}) / 2$$

$$F2, \mu Y = \sqrt{(1 + WACCY) \times [1 - (1 + APC_{\mu}) / (1 + WACCY)]} / [1 - [(1 + APC_{\mu}) / (1 + WACCY)]^{\mu}]$$

and where

- $ACC_{\mu Y}$: Annual CAPEX Cost of asset μ and year Y. It includes the annual depreciation and the cost of capital.

- WACCY: WACC of year Y.
- $GRC_{\mu Y, \text{begin}}$: Gross Replacement Cost of asset μ at the beginning of year Y.
- $GRC_{\mu Y, \text{end}}$: Gross Replacement Cost of asset μ at the end of year Y.
- APC_{μ} : Annual Price Change of asset μ .
- L_{μ} : Lifetime of asset μ .

Remarks:

The formula assumes that:

- In the beginning of year Y was invested in an asset and that at the middle of each year of the lifetime of the asset revenues will be generated.
- The annual price change is constant over the lifetime of the asset.
- The asset price does not evolve during the year, i.e. price changes only appear at January 1st.

The factor $F_{1, \mu Y}$ represents the value of asset μ in the middle of year Y.

- The purpose of the arithmetic average of $GRC_{\mu Y, \text{begin}}$ and $GRC_{\mu Y, \text{end}}$ is to take into account investments or disinvestments of asset μ during the year Y.
- The arithmetic average of $GRC_{\mu Y, \text{begin}}$ and $GRC_{\mu Y, \text{end}}$ does not filter out the price evolution of the asset μ during the year Y.

The difference between the formula of BIPT and the formula of Exhibit 5, p. B3. of the white paper of Analysys is the factor $1 / \sqrt{1 + APC_{\mu}}$, which filters out the price evolution of the asset μ during the year Y.

The gross replacement cost (GRC) of assets at any particular point in time is calculated as the sum over all assets owned by the business at that point in time, of the investment that would be necessary to purchase and install new replacements for those assets at that point in time (using modern equivalent assets if the existing assets are no longer available or efficient). The replacement value of assets, used for costing purposes should always include the gross value of every asset in use by the business (the current cost of replacing it with a new, possibly modern equivalent asset), irrespective of the history of depreciation of that asset in any financial accounts to date.

L_{μ} : Lifetime of asset μ , i.e. the expected useful lifetime of the new asset μ .

The depreciation period and the expected useful lifetime of a new asset are defined differently. The depreciation period refers to accounting. The expected useful lifetime of a new asset does not refer to accounting. It refers to the period that is expected that a new asset will be used. The main factor to determine the expected useful lifetime of a new asset is the evolution of the associated operational costs, i.e. the asset will be replaced when operating becomes too expensive. Another factor is the appearance of new technology: if in the future new technology will come-up it could be that the asset will be replaced (even if it is not too expensive to operate).

3.4.1.3 Regulated cost price based asset valuation.

In 2008, the valuation of the ATM asset has been aligned with the BIPT BROBA model 2008.

In the ATM network architecture two levels of ATM switches are present : the local ATM switch , and the area level ATM switch, the area level nodes correspond to the interconnect areas used in BRIO, BROBA and BROTSOLL . The function of the ATM network is to provide switched Virtual Paths between a port of a local switch and another port of the same local switch (local VPs) or of an area switch (nonlocal VPs). For Virtual Path switching two equipments are involved : the ATM switches themselves (also called switching fabric) , and the trunk interfaces to interconnect distant ATM switches . In order to access configured Virtual Paths, access interface equipments are needed at the border of the local or area switches.

The ATM asset contains the investment costs of the equipments delivering switched Virtual Paths (the ATM local switches , the ATM area switches, the ATM trunk interfaces for the backhaul links between the ATM switches) and the equipment delivering access to VPs (ATM interfaces for the ATM tributaries or clients).

The costing of the asset is thus decomposed in the costing of the VP switching equipment (backbone ATM equipment) and in the costing of the access to VP equipment .

3.4.1.4 CAPEX Costing of the VP switching component

This costing is based on the inventory of switched Virtual paths (local VPs, and non-local VPs) configured on the Belgacom ATM network . Each virtual path is valued using the BIPT BROBA VP tariffs 2008 . Indeed , the BIPT tariffs are cost based and are established using a bottom-up costing model.

However, the BIPT tariffs being full cost tariffs , they integrate the ATM CAPEX, the ATM OPEX , the backhaul transmission costs (links between the ATM trunks interfaces) , the IT costs and the overhead costs. Applying directly the BIPT BROBA tariffs would incorporate costs other than ATM CAPEX costs in the ATM asset. Therefore the costing is conducted in 3 steps:

The first step eliminates the IT , the overhead and the backhaul costs component from the BIPT tariff computing a tariff structure free of IT/overhead/backhaul. The second step applies this tariff to the inventory of VPs yielding ATM costs containing ATM CAPEX and ATM OPEX. The third step calculates the OPEX costs corresponding to the network equipment amounts allowing the VPs of the inventory and subtracts this cost from the ATM CAPEX&OPEX . The end result is an estimation of the pure CAPEX cost for all configured VPs .

There are many advantages in using this approach; first , the BIPT BROBA tariffs per VP value complex VP characteristics like Quality of Service, Peak Cell Rate / Sustained Cell Rate ratio, distance aspect (local , nonlocal VPs) and VP capacity. Secondly, the BIPT tariffs also value other material costs directly involved in ATM like cabling investment costs and ATM management platform investment costs.

3.4.1.5 CAPEX Costing of the ATM access component

The CAPEX costing of the ATM access component is based on the detailed inventory of access lines ending-up in ATM switches; the source of this inventory is the ITR infrastructure inventory system. Only the tributary lines are considered in this inventory as the accesses for ATM interswitch links (trunks) are already valued in the VP switching component.

The same unit costs of ATM ports as in the BIPT Bottom-Up BROBA model are applied on this inventory depending on the capacity of tributary lines to come to the CAPEX costs of the ATM access component.

4 ABC stream

4.1 Step1: Costs regrouping

Belgacom enregistre les coûts d'une part sur un compte défini dans la comptabilité générale et d'autre part sur un centre de coûts défini dans la comptabilité analytique. Cette étape a pour objectif d'agréger ces données afin de simplifier la manipulation de ces données.

Deux types de regroupement sont effectués :

- celui des 538 comptes de la comptabilité générale en 154 cost pools et
- celui des 492 centres de coûts en 247 groupes de centres de coûts.

Un **cost pool** est un groupe de coûts qui ont des caractéristiques communes et sont issus de la même famille de nature de coûts.

Dans le cas de ressources matérielles, seront regroupés les coûts qui remplissent une fonction similaire. Ainsi, le cost pool "Dépenses en formation" regroupe les coûts de formations organisées par Belgacom pour son staff, les coûts de séminaires extérieurs et les coûts de magazines, de livres et de documentation liés aux formations.

En ce qui concerne les ressources humaines, seront rassemblés les coûts des travailleurs qui ont le même profil. Ainsi, le cost pool "Level S" reprend les salaires des employés de niveau S (force de vente) ainsi que les primes et contributions allouées à ces travailleurs.

Les coûts repris dans un même cost pool ont une relation de causalité identique avec les activités ou les produits auxquels ils peuvent être attribués, ils ont le même "resource driver".

Un **groupe de centres de coûts** regroupe des centres de coûts qui ont des caractéristiques communes et qui réalisent des activités similaires. Par exemple, les centres de coûts représentant un point de vente particulier sont repris sous le groupe des centres de coûts des points de vente en général (p.ex. le point de vente de Wavre appartient au groupe de centres de coûts "points de vente" car tous les points de vente réalisent le même type d'activités et peuvent donc être regroupés au sein d'un même groupe).

Chaque groupe de centres de coûts consomme les différents cost pools. En effet, le point de vente de Wavre emploie des employés de niveau S. Dès lors le groupe de centres de coûts "points de vente" regroupera la « consommation » en employés de niveau S de l'ensemble des points de vente.

Ainsi, les combinaisons cost pool/groupe de centres de coûts forment des groupes de ressources. Ce sont ces groupes de ressources qui constituent la base de coûts du modèle, et plus particulièrement du flux ABC.

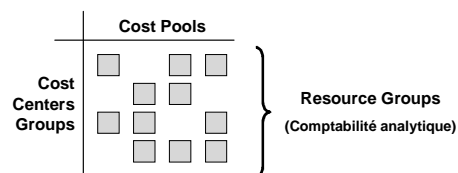


Figure 6: Groupes de ressources

4.2 Step 2: Allocating costs directly to the products

The second step consists of allocating costs directly to the products to which they are related.

4.2.1 Material out of stock

The MOS is divided into two main categories: CPE and network material.

- For the CPE, there exists in general a 1-to-1 relationship between the costs and the products to which they are related. Each account name refers to a specific type of material so that costs can be allocated to the related product.
- For the network material, the costs are allocated to the products following their descriptions and GL account.

4.2.2 Services and other goods

The services and other goods can be classified into 4 major categories: interconnection costs, commissions, infrastructure and other charges:

➤ Interconnection :

Two cases are possible for allocating these costs to the respective products:

- The nature of the interconnection fee allows allocating the total cost pool directly to the related product (67%). In this case no allocation key is used.
- Cost pools representing 33% of total interconnection costs are allocated on different products pro rata the interconnect invoices paid by Belgacom to the different OLO's. This information is coming principally from CBU, EBU and CWS financial reporting.

➤ Commissions paid to third parties

- The nature of the commission allows allocating the total cost pool directly to the related product. In this case no allocation key is used.
- Some cost pools group commissions for different products. The allocation is made pro rata the commissions paid to the indirect sales channels on the different products sold by them.

➤ Infrastructure:

Here we distinguish on one side the costs for the international infrastructure (93,8%) and on the other side the costs for the national infrastructure (6,2%). For the international infrastructure these costs are allocated to the products (data BES, BWS, internat. satellite) either directly or following a detailed analysis done by the EBU division. For national infrastructure these costs are mainly allocated to the CPE Other product on the basis of the outsourced invoices within the COP department and linked to customers' installations.

4.2.3 Remuneration, social security costs and pensions.

Within some departments and cost center groups, the remuneration costs could be allocated directly to the products. This is especially the case for activities within Staff and Support on behalf of the affiliates. Due to the integration of Staff and Support personnel of Mobile, Telindus and Skynet this direct allocation is becoming more important. These costs are booked on the product "Subsidiaries&Externals".

4.2.4 Depreciation, write-offs, provisions for liabilities and WACC

These costs are allocated to products on the basis of the underlying assets. Mainly they are allocated to the CPE Other, Fast Internet and iDTV.

4.3 Step 3: Allocating costs to activities

In the ABC flow three different types of activities appear:

- The **primary** (Business and Network/CFO Cable) activities give directly an added value to the products. They cover:
 - Strategy, product and market management
 - Fulfilment: from sales, order handling to delivery
 - Service assurance: from services after sales to repairing
 - Billing and collection
 - Copper work for customers and maintenance&repair of cable.
- The **management** activities are essential for a good functioning of the company. They cover:
 - Human resource management
 - Financial management
 - Administration and general support
 - Operational excellence
- The **support** activities covering:
 - Supply chain and facilities services

These 10 processes are divided into 29 sub-processes which on their side contain 96 activities. It is on these activities that the “indirect” costs will be allocated. Cost center groups, cost pools or the combination of both determine in which activities they are involved.

In general we can say that there are 5 methodologies to allocate the indirect costs:

- *Objective measurements going directly to the activity*
 - On the basis of the work hours performed by SDE COP people for each corresponding activity. The reporting system used is CLARA. Those work hours have been translated into Dispatching Unit (DU) by taking into account standard time per activity as well as per product.
 - On the basis of BCI cases handled by the call center operators in CBU/CCA. The BCI system does not only register the sales by product but also the cases by type, mapped to the ABC subprocesses such as order handling, non-billing related service assurance and billing-related service assurance.
 - On the basis of a BAIN field study registering the activities in CBU/DIR (shops).

- The cost pool “salaries” and the personnel costs linked to this category of employees are allocated to the activities thanks to this methodology.
- *Objective measurements of the FTE input*
 - Based on the number of FTEs (full time equivalents) working on a certain activity. For the need of the 2009 ABC flow, we used FTE templates per cost center group or cost center for which each responsible had to fill in the number of FTEs – per worker’s category-performed on the activities linked to their cost center or cost center group . The ABC flow takes the annual average number of FTEs from SAP HR database.
 - The cost pool “salaries” and the personnel costs linked to this category of employees are allocated to the activities thanks to this methodology.

➤ *Assignment based on a cost pool*

In certain cases, there is a direct link between a cost pool and an activity: e.g. cost pool 6400 “tax fleet utility” goes directly to the activity 6.4.1 “Manage, maintain and repair utility vehicles”.

➤ *Assignment on the combination cost center group and cost pool*

- The combination cost pool 6010 “Network materials” and CCG 78400 “GSC-IFM-BTS-Building & Technical Services” goes to the activity 6.2.2 “Manage, maintain & repair buildings”.
- The combination cost pool 61070 “waste” and CCG 49480 “CSM-LOG-Waste mgmt” goes to activity 6.1.7 “Manage waste and scrap”.

➤ *Assignment on the basis of a specific analysis allowing to establish a causal relationship*

E.g. energy costs are distributed on the basis of a logical analysis between:

- 6.2.2 “Manage, maintain and repair buildings”
- 6.3.1 “ Manage the power chain for telecom infrastructure”.

4.4 Step 4: Allocation of the support costs

This step has as objective to allocate the support costs to:

- Primary and management activities
- Directly to the products
- The Network / IT flow

In these costs we find:

- The majority of the costs re. GSC (Corporate Internal Services) department
- The majority of the costs re. CSM department
- Other support costs (activities provided by other divisions like FIN, CBU, EBU)

The support department GSC provides support to all the Belgacom divisions and to itself while other divisions can also have support activities but then only for themselves.

The costs of the support activities are allocated following a cascade principle. There is no mutual assignment. Once the cost of a support activity has been allocated, this activity can no more receive any other cost.

4.4.1 Allocation of the ABC IT support costs.(process 7)

The ABC IT costs relate mainly to “End Users Support costs” and are sent to the IT_Constellation flow for further treatment.

4.4.2 Allocation of the logistics activities (process 6)

The logistics activities of process 6 are principally realised by the GSC and CSM departments. The logistics activities carried out by other divisions are allocated on the products/activities of the concerned division.

4.4.2.1 Allocation of building costs

These activities are mainly delivered by the GSC department.

The database “Speedikon” manages the space occupied by each division and this for each type of building. The square meters are classified by:

- *Room categories:* housing, office, parking, shop, storage, technical building, technical telecom, unusable, workshop.
- *Type of room category:* e.g. for the storage category, we distinguish the following 3 types: archives, reserves and warehouse.

Based on this information, each square meter is allocated to one of the ABC categories following the causality principle. The ABC categories will be the basis for allocating the cost of buildings to intermediate (other activities) and final objects (products) of the cost model.

4.4.2.2 Allocation of fleet costs.

The FMS database gives the number of vehicles of Belgacom SA in 3 categories: management, sales and utility cars and this for each division. Information on fuel consumption is also available. The general key is the number of vehicles per category per activity within a division.

4.4.2.3 Allocation of other facilities costs.

The activities assigned in this step concern energy, moves, internal mail distribution, etc.

Moves

The activity “moves” is allocated following the number of office moves within a division.

Internal mail distribution

This activity is assigned to activities using this kind of services (mainly the activities defined as office activities). The number of FTE carrying out these activities is the key.

Catering

Catering is allocated over the activities using the catering service (mainly the activities defined as office activities) using the number of FTE carrying out these activities as key.

Print and copy shops

This activity is assigned to the activities using the different print and copy shop services (outgoing invoices excluded). The key can either be the number of transactions (mailings) registered by the print shop of Libramont, the value of the purchase order or the number of FTEs using these activities (copy shop costs).

Energy telecom

The energy costs feeding the telecom equipments are allocated to the concerned divisions depending on the consumption measured in Mwh or amperes

4.4.2.4 Allocation of the supply chain activities costs.

These activities are allocated in 5 steps. Sometimes the supply chain costs can also be assigned directly to a product as there may be a causal relationship.

The first allocation refers to: waste grid

The waste costs are divided over the different concerned divisions – SDE/COP (for telecom waste), CSM (waste linked to the supply chain) and GSC (office waste)

The cost for SDE/IT&N goes to the Network / IT flow. The CSM costs are mainly allocated to the CPEs and iDTV based on the number of picking lines. The other costs of GSC are assigned to office activities depending on the number of square meters used.

The second allocation refers to: purchasing and APC grid

For the purchase activity, the initial key is the purchase/contract order values per division and per SOG type; the secondary key is based on the combined cost of this SOG with the activity and/or product associated within the division.

For the treatment and follow-up of invoices, the primary key is the number of invoices weighted in lines per division and per SOG type; the secondary key is the combination with the activities and/or products of the division.

The third allocation refers to: warehousing grid

The activity linked to the warehouse management is allocated in function of the number of “picking” lines (as well as for the consumption materials and the goods transferred to other stores) per division and per good. The secondary key combines this with the activities and/or products of the division.

The fourth allocation refers to: transport grid

The activity linked to the internal distribution is allocated in function of the transported volumes and delivery destination (point of sales, secured area...)

The fifth allocation refers to: cables and reverse logistics grid

The activity linked to cables is allocated directly to the Network / IT flow.

The activity linked to the treatment of re-entries is allocated in function of the number of picking lines per good.

4.5 Step 5: Allocation of the primary and management activities to the products

In the fifth and last step, primary and management activities are allocated to products. At this stage in the model all support activities have already been distributed and are as such included in the primary and management activities.

The REG department has defined a key for each activity/division combination. Such a key has been defined for every activity of the ABC dictionary taking into account the division executing this activity.

Wherever applicable, for certain activities, driver quantities have been calculated by taking into account specificity and complexity of each product (see below detailed descriptions).

Wherever necessary, connection volume is used as 2nd key for provisioning activities and subscription volume is used as 2nd key for repair activities (see below detailed descriptions).

Wherever necessary, revenue volume is used as 2nd key for certain activities.

4.5.1 Allocation of the business primary activities.

These activities are part of the following processes:

4.5.1.1 Process 1: Strategy, Product and Market Management.

Activity	Division	Driver
1.1.1. Plan, develop and manage business	20_FIN	Generic - Total costs per product
1.1.1. Plan, develop and manage business	20_GHQ	Generic - Activity product allocation
1.1.1. Plan, develop and manage business	20_STR	Generic - Total costs per product
1.1.1. Plan, develop and manage business	39_CBU	Direct
1.1.1. Plan, develop and manage business	41_EBU	Direct

1.2.1. Acquire, retain & stimulate customers (marketing)	20_COM	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20_CRL	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20_CSR	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20_FIN	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20_GHQ	Generic - Activity product allocation
1.2.1. Acquire, retain & stimulate customers (marketing)	20_GHR	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20_STR	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	20-LEG	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	34_MST	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing)	39_CBU	FTE per product
1.2.1. Acquire, retain & stimulate customers (marketing)	40_CWS	FTE per product // Rev per product
1.2.1. Acquire, retain & stimulate customers (marketing)	41_EBU	FTE per product
1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	20_COM	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	20_CSR	BGC retail product portfolio turnover (terminating rates & BVAS out / DAS OLO revenues taken out)
1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	20_GHQ	Generic - Activity product allocation
1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	39_CBU	Com per product

1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	40_CWS	FTE per product // Rev per product
1.2.1. Acquire, retain & stimulate customers (marketing) (communication costs)	41_EBU	Com per product

For staff & support divisions, costs are often allocated depending on the costs already charged to the products, independently of the subprocess, except in the case of the 1.2.1. activity, based on the turnover per product.

For SDE & customer divisions (CBU, EBU & CWS), costs are mainly allocated as follows :

- depending on the FTE's / revenues per product,
- on the basis of the communication costs per product,
- directly to one product,
- depending on the FTE's per product as 1st key and on the basis of revenue per product as 2nd key.

4.5.1.2 Process 2: Fulfilment: activities going from sales, order handling to installation.

Activity	Division	Driver
2.3.1. Sell products & services through indirect sales channels	20_GHQ	Generic - Activity product allocation
2.3.1. Sell products & services through indirect sales channels	39_CBU	Sold volumes (IND) * sales time
2.3.1. Sell products & services through indirect sales channels	41_EBU	BCI & TNA TTVA
2.3.2. Provide sales & info services in Points Of Sales	20_GHQ	Generic - Activity product allocation
2.3.2. Provide sales & info services in Points Of Sales	39_CBU	Sold volumes (DIR) * sales time
2.3.3. Develop & sell proposals for standard products or integrated solutions (including client visits)	20_GHQ	Generic - Activity product allocation
2.3.3. Develop & sell proposals for standard products or integrated solutions (including client visits)	40_CWS	Bonus pay-out
2.3.3. Develop & sell proposals for standard products or integrated solutions (including client visits)	41_EBU	BCI TTVA
2.3.4. Provide sales & info services through telesales or contact center (voice, fax, letter, e-mail)	20_CRL	Sold volumes (CCA) * sales time

2.3.4. Provide sales & info services through telesales or contact center (voice, fax, letter, e-mail)	20_GHQ	Generic - Activity product allocation
2.3.4. Provide sales & info services through telesales or contact center (voice, fax, letter, e-mail)	39_CBU	Sold volumes (CCA) * sales time
2.3.5. Negotiate and establish BRIO/BRUO/BROBA/BROTSOLL agreements with operators / service providers	20_GHQ	Generic - Activity product allocation
2.3.5. Negotiate and establish BRIO/BRUO/BROBA/BROTSOLL agreements with operators / service providers	40_CWS	Bonus pay-out
2.3.6. Close presales, sales interactions and transactions about products & services through the website channel	20_GHQ	Generic - Activity product allocation
2.3.6. Close presales, sales interactions and transactions about products & services through the website channel	39_CBU	Sold products (ECH)
2.3.7. Sell DIS products & services through DIS channel	20_GHQ	Generic - Activity product allocation
2.3.7. Sell DIS products & services through DIS channel	39_CBU	FTE per product
2.4.1. Handle customer orders	20_GHQ	Generic - Activity product allocation
2.4.1. Handle customer orders	39_CBU	Order handling CBU/EBU BCI cases
2.4.1. Handle customer orders	40_CWS	actions
2.4.1. Handle customer orders	41_EBU	Order handling EBU BCI cases
2.5.1. Execute remote provisioning - Mass (COP-CRO-IAC)	20_GHQ	Generic - Activity product allocation
2.5.1. Execute remote provisioning - Mass (COP-CRO-IAC)	50_SDE	working hours
2.5.2. Execute remote provisioning - Prof (COP-EIS-PPC)	20_GHQ	Generic - Activity product allocation
2.5.2. Execute remote provisioning - Prof (COP-EIS-PPC)	50_SDE	#configured nodes
2.6.4. Dispatch, monitor and close provisioning work orders (not related to the cable) - Mass (COP-CFOx-IDC-MAS)	20_GHQ	Generic - Activity product allocation
2.6.4. Dispatch, monitor and close provisioning work orders (not related to the cable) - Mass (COP-CFOx-IDC-MAS)	50_SDE	provisioning #DU

2.6.5. Dispatch, monitor and close provisioning work orders (not related to the cable) - Prof (COP-CFOx-IDC-PRF)	20_GHQ	Generic - Activity product allocation
2.6.5. Dispatch, monitor and close provisioning work orders (not related to the cable) - Prof (COP-CFOx-IDC-PRF)	50_SDE	provisioning #DU
2.6.6. Dispatch, monitor and close provisioning Cu splicing work orders related to the introduction cable (COP-CFOx-IDC-Cable)	20_GHQ	Generic - Activity product allocation
2.6.6. Dispatch, monitor and close provisioning Cu splicing work orders related to the introduction cable (COP-CFOx-IDC-Cable)	49_CSM	provisioning #DU
2.6.6. Dispatch, monitor and close provisioning Cu splicing work orders related to the introduction cable (COP-CFOx-IDC-Cable)	50_SDE	provisioning #DU
2.7.1. Execute field provisioning (with or without customer visit) - Mass (COP-CFOx-MAS)	20_CRL	provisioning #DU
2.7.1. Execute field provisioning (with or without customer visit) - Mass (COP-CFOx-MAS)	20_GHQ	Generic - Activity product allocation
2.7.1. Execute field provisioning (with or without customer visit) - Mass (COP-CFOx-MAS)	50_SDE	provisioning #DU
2.7.1. Execute field provisioning (with or without customer visit) - Mass (COP-CFOx-MAS)	79_BSF	provisioning #DU
2.7.2. Execute field provisioning (with or without customer visit) - Prof (COP-CFOx-PRF)	20_CRL	provisioning #DU
2.7.2. Execute field provisioning (with or without customer visit) - Prof (COP-CFOx-PRF)	20_GHQ	Generic - Activity product allocation
2.7.2. Execute field provisioning (with or without customer visit) - Prof (COP-CFOx-PRF)	50_SDE	provisioning #DU
2.7.2. Execute field provisioning (with or without customer visit) - Prof (COP-CFOx-PRF)	79_BSF	provisioning #DU
2.8.4. Manage projects related to the provisioning of telecom & IT solutions - Prof	20_GHQ	Generic - Activity product allocation

2.8.4. Manage projects related to the provisioning of telecom & IT solutions - Prof	40_CWS	actions
2.8.4. Manage projects related to the provisioning of telecom & IT solutions - Prof	41_EBU	Direct
2.8.4. Manage projects related to the provisioning of telecom & IT solutions - Prof	50_SDE	#configured nodes

We distinguish 6 different types of activities in this process:

- Activities linked to sales
- Activities linked to order handling
- Activities linked to remote provisioning
- Activities linked to field provisioning
- Activities linked to field provisioning (cable related included) support
- Activities linked to project management

For staff & support divisions, costs are often allocated depending on the costs already charged to the products, independently of the subprocess.

For SDE & customer divisions (CBU, EBU & CWS), costs are allocated as follows :

1° Activities linked to sales

The costs are mainly allocated as follows:

- based on the sales, often weighted with the average selling time,
- based on the TTVA (total transaction value of new contracts),
- based on the FTEs ,
- based on bonus.

2° Activities linked to order handling

The costs are mainly allocated as follows:

- based on the order handling BCI cases,
- based on relevant actions.

3° Activities linked to remote provisioning

The costs are mainly allocated as follows:

- based on configuration work hours taking into account standard time of treatment per product ,
- based on configured nodes taking into account complexity of configuration per product.

4° Activities linked to field provisioning

The costs are mainly allocated as follows:

- based on provisioning DUs.

5° Activities linked to field provisioning (cable related included) support

The costs are mainly allocated as follows:

- based on provisioning DUs,
- based on provisioning cable related DUs. This kind of activity cost is, rather than directly to ABC products, firstly sent to network objects and then via EUSs allocated to ABC products (see Network Stream chapter for details).

6° Activities linked to project management

The costs are mainly allocated as follows:

- directly to one product,
- based on configured nodes taking into account the complexity of configuration per product,
- based on relevant actions .

4.5.1.3 Process 3: Service Assurance: fault handling and repairing

Activity	Division	Driver
3.2.1. Receive and handle customer inquiries or complaints not related to billing	39_CBU	After-sales CBU/EBU BCI cases
3.2.1. Receive and handle customer inquiries or complaints not related to billing	41_EBU	After-sales EBU BCI cases
3.2.1. Receive and handle customer inquiries or complaints not related to billing	40_CWS	actions
3.2.1. Receive and handle customer inquiries or complaints not related to billing	20_GHQ	Generic - Activity product allocation
3.2.2. Provide Customer Service/SLA management – Prof	40_CWS	actions
3.2.2. Provide Customer Service/SLA management – Prof	41_EBU	Direct
3.2.2. Provide Customer Service/SLA management – Prof	50_SDE	#customers
3.2.2. Provide Customer Service/SLA management – Prof	20_GHQ	Generic - Activity product allocation
3.4.1. Execute fault handling & remote repair - Mass (COP-CRO-CHC)	50_SDE	working hours
3.4.1. Execute fault handling & remote repair - Mass (COP-CRO-CHC)	20_GHQ	Generic - Activity product allocation
3.4.2 Execute fault handling & remote repair - Prof (COP-EIS-RPC)	50_SDE	working hours

3.4.2 Execute fault handling & remote repair - Prof (COP-EIS-RPC)	20_GHQ	Generic - Activity product allocation
3.5.1. Dispatch, monitor and close repair work orders (not related to the cable) - Mass (COP-CFOx-IDC-MAS)	50_SDE	repair #DU
3.5.1. Dispatch, monitor and close repair work orders (not related to the cable) - Mass (COP-CFOx-IDC-MAS)	20_GHQ	Generic - Activity product allocation
3.5.2. Dispatch, monitor and close repair work orders (not related to the cable) - Prof (COP-CFOx-IDC-PRF)	50_SDE	repair #DU
3.5.2. Dispatch, monitor and close repair work orders (not related to the cable) - Prof (COP-CFOx-IDC-PRF)	20_GHQ	Generic - Activity product allocation
3.5.3. Dispatch, monitor and close Cu splicing work orders related to the repair of cable network - (COP-CFOx-IDC-Cable)	50_SDE	repair #DU
3.5.3. Dispatch, monitor and close Cu splicing work orders related to the repair of cable network - (COP-CFOx-IDC-Cable)	20_GHQ	Generic - Activity product allocation
3.5.3. Dispatch, monitor and close Cu splicing work orders related to the repair of cable network - (COP-CFOx-IDC-Cable)	49_CSM	repair #DU
3.6.1. Execute field repair - Mass (COP-CFOx-MAS)	50_SDE	repair #DU
3.6.1. Execute field repair - Mass (COP-CFOx-MAS)	20_GHQ	Generic - Activity product allocation
3.6.1. Execute field repair - Mass (COP-CFOx-MAS)	79_BSF	repair #DU
3.6.2. Execute field repair - Prof (COP-CFOx-PRF)	50_SDE	repair #DU
3.6.2. Execute field repair - Prof (COP-CFOx-PRF)	20_GHQ	Generic - Activity product allocation
3.6.2. Execute field repair - Prof (COP-CFOx-PRF)	49_CSM	repair #DU
3.6.2. Execute field repair - Prof (COP-CFOx-PRF)	79_BSF	repair #DU

We distinguish 5 different types of activities in this process:

- Activities linked to customer inquiries or complaints not related to billing
- Activity linked to customer service and SLA management
- Activities linked to remote repair
- Activities linked to field repair
- Activities linked to field repair (cable related included) support

For staff & support divisions, costs are often allocated depending on the costs already charged to the products, independently of the subprocess.

For SDE & customer divisions (CBU, EBU & CWS), costs are mainly allocated as follows :

1° Activities linked to customer inquiries or complaints not related to billing

The costs are mainly allocated as follows:

- directly to one product
- based on after-sales BCI cases,
- based on relevant actions.

2° Activities linked to customer service and SLA management

The costs are mainly allocated as follows:

- directly to one product,
- based on relevant actions,
- based on number of customers treated.

3° Activities linked to remote repair

The costs are mainly allocated as follows:

- based on work hours taking into account standard time of treatment per product..

4° Activities linked to field repair

The costs are mainly allocated as follows:

- based on repair DUs .

5° Activities linked to field repair (cable related included) support

The costs are mainly allocated as follows:

- based on repair DUs,
- based on repair cable related DUs. This kind of activity cost is, rather than directly to ABC products, firstly sent to network objects and then via EUSs allocated to ABC products (see Network Stream chapter for details).

4.5.1.4 Process 4: Billing and Collection

Activity	Division	Driver
4.1.1. Receive and handle COB-related billing inquiries & complaints	20_CRL	Billing BCI cases
4.1.1. Receive and handle COB-related billing inquiries & complaints	20_GHQ	Generic - Activity product allocation
4.1.1. Receive and handle COB-related billing inquiries & complaints	39_CBU	Billing CBU/EBU BCI cases
4.1.1. Receive and handle COB-related billing inquiries & complaints	40_CWS	Billed revenues per system

4.1.1. Receive and handle COB-related billing inquiries & complaints	41_EBU	Billing EBU BCI cases
4.2.1. Manage COB-related pricing reference data and non-usage / (re)rating / discounting processes	20_GHQ	Generic - Activity product allocation
4.2.1. Manage COB-related pricing reference data and non-usage / (re)rating / discounting processes	50_SDE	Generic. Calculated cost per product for the whole of sub-processes 4.1., 4.2. & 4.3., to come to percentage of cost per product to use as key for this activity
4.2.3. Manage printing, fulfilment and distribution of COB invoices	20_GHQ	Generic - Activity product allocation
4.2.3. Manage printing, fulfilment and distribution of COB invoices	39_CBU	Billing cycle
4.2.3. Manage printing, fulfilment and distribution of COB invoices	78_IFM	Billing cycle
4.2.4. Manage COB-related new billing developments	20_GHQ	Generic - Activity product allocation
4.2.4. Manage COB-related new billing developments	39_CBU	Billing cycle
4.2.5. Manage and control COB-related billing related operations & financial flows	20_FIN	Generic. Calculated cost per product for the whole of sub-processes 4.1., 4.2. & 4.3., to come to percentage of cost per product to use as key for this activity
4.2.5. Manage and control COB-related billing related operations & financial flows	20_GHQ	Generic. Calculated cost per product for the whole of sub-processes 4.1., 4.2. & 4.3., to come to percentage of cost per product to use as key for this activity
4.2.5. Manage and control COB-related billing related operations & financial flows	39_CBU	Generic. Calculated cost per product for the whole of sub-processes 4.1., 4.2. & 4.3., to come to percentage of cost per product to use as key for this activity
4.2.5. Manage and control COB-related billing related operations & financial flows	40_CWS	Billed revenues per system
4.2.6. Manage and control the DIMS data	20_GHQ	Generic - Activity product allocation
4.2.6. Manage and control the DIMS data	39_CBU	Direct
4.2.7. Manage and control the Soccabis data	20_GHQ	Generic - Activity product allocation
4.2.7. Manage and control the Soccabis data	39_CBU	Soccabis products' revenues
4.3.1. Prevent, investigate & detect COB-related customer fraud	20_GHQ	Generic - Activity product allocation
4.3.1. Prevent, investigate & detect COB-related customer fraud	20_SEG	Treated volumes * handling time

4.3.1. Prevent, investigate & detect COB-related customer fraud	39_CBU	COB alarms
4.3.2. Manage COB-related payments	20_GHQ	Generic - Activity product allocation
4.3.2. Manage COB-related payments	39_CBU	Billing cycle
4.3.3. Manage COB-related debit collection	20_GHQ	Generic - Activity product allocation
4.3.3. Manage COB-related debit collection	39_CBU	Revenue by product of CBU/EBU unpaid invoices (invoices with due date 2009 and customer status: DCO, CRT, DFR, BAN, DNO, DON, REC)
4.3.3. Manage COB-related debit collection	40_CWS	Billed revenues per system
4.3.3. Manage COB-related debit collection	41_EBU	Revenue by product of EBU unpaid invoices (invoices with due date 2009 and customer status: DCO, CRT, DFR, BAN, DNO, DON, REC)
4.4.1. Manage SAP A/R related manual bills / credit notes	20_FIN	Number of manual invoices/credit notes
4.4.1. Manage SAP A/R related manual bills / credit notes	20_GHQ	Generic - Activity product allocation
4.4.1. Manage SAP A/R related manual bills / credit notes	20_SEG	Number of manual invoices/credit notes
4.4.1. Manage SAP A/R related manual bills / credit notes	39_CBU	Number of manual invoices/credit notes
4.4.1. Manage SAP A/R related manual bills / credit notes	40_CWS	Billed revenues per system
4.4.1. Manage SAP A/R related manual bills / credit notes	41_EBU	Number of manual invoices/credit notes
4.5.1. Manage IBIS-related national inter-carrier billing problem handling, production & collection	20_GHQ	Generic - Activity product allocation
4.5.1. Manage IBIS-related national inter-carrier billing problem handling, production & collection	40_CWS	Billed revenues per system
4.5.1. Manage IBIS-related national inter-carrier billing problem handling, production & collection	78_IFM	Billed revenues per system

For staff & support divisions, costs are often allocated depending on the costs already charged to the products, independently of the subprocess.

For SDE & customer divisions (CBU, EBU & CWS), costs are mainly allocated as follows :

- directly to one product,
- based on billing BCI cases,
- based on billing cycle,
- based on revenues per product,

- based on the turnover linked to unpaid invoices,
- based on a specific SAP analysis (manual invoices by product),
- based on billed revenue per billing system.

4.5.2 Allocation of the management activities.

Four processes cover the management activities:

- HR Management (process 8)
- Financial Management (process 9)
- Administration & General Support (process 10)
- Operational excellence (process 11)

Management activities are mainly allocated to the products according to the cost of products. This is logic since management activities are overhead-type of activities.

4.5.2.1 Process 8: HR Management

The costs linked to the HR management are mainly allocated to the products according to the total Belgacom S.A. remuneration costs.

In some cases, the keys relate to the remuneration costs of a specific division.

4.5.2.2 Process 9: Financial Management

For the Finance department, the costs linked to the financial management are mainly allocated to the products according to a blended key based on the revenue for 50% and on the attributed costs for the other 50%.

For the other divisions a total cost key is used (at divisional level or Belgacom-wide).

4.5.2.3 Process 10: Administration & General Support

The costs linked to the administration & general support activities are mainly allocated to the products on the basis of total costs or remuneration costs of the concerned division or of all divisions when the support is Belgacom-wide.

The PBS (Pension Back Service) amount, which only includes the pension charges related to the active personnel and is in line with the cost accepted by the BIPT in the BRIO, is allocated to all Belgacom products on the basis of remunerations. The same key applies to the collective bonus distributed to the personnel.

The REG activity is subject to an analysis in two steps. A first key is computed based on the time spent by the personnel on regulated reference offers (BRIO, BRUO, BROBA & BROTSOLL) while the remaining time is allocated to the other products based on total costs. Secondary keys are then computed based on volumes to get costs assigned by product.

4.5.2.4 Process 11: Operational excellence

In this process a total cost key is used (at divisional level or Belgacom-wide).

4.5.3 Allocation of the Network/CFO Cable activities

Activity	Division	Driver
5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)	20_GHQ	Generic - Activity product allocation
5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)	79_BSF	Direct
5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)	20_GHQ	Generic - Activity product allocation
5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)	79_BSF	Direct

For staff & support divisions, costs are often allocated depending on the costs already charged to the products, independently of the subprocess.

Process 5 is Network related and all of its activities are performed by SDE. All SDE allocations are described in the Network Stream chapter.

The GHQ and BSF support divisions however also have costs linked to Cable related activities.

Those costs are mainly allocated as follows:

- based on provisioning cable related DUs. This kind of activity cost is, rather than directly to ABC products, firstly sent to network objects and then via EUSs allocated to ABC products (see Network Stream chapter for details),
- Based on repair cable related DUs. This kind of activity cost is, rather than directly to ABC products, firstly sent to network objects and then via EUSs allocated to ABC products (see Network Stream chapter for details).

5 Network&IT OPEX de-aggregation

5.1 Common OPEX allocation stream IT and Network

In the current organisation, there are no distinct ranges for IT cost centers and Network cost centers. Thus, a same cost center may register IT costs together with non IT costs.

The first goal of the allocation stream is to separate all costs into IT specific costs and Network specific costs.

5.1.1 GL61 accounts – Services and Other Goods (SOG)

The GL accounts in the 61 range register outsourced maintenance costs as well as miscellaneous costs driven by staff (GSM, memberships, office material, internal events etc.).

The GL61 accounts were classified in two categories:

- those that may contain some manpower related consumption goods
- those that clearly do not contain manpower related consumption goods

In both cases, an attribution to cost objects is always done at SAP record level. This attribution takes place using different criteria:

- attribution based on GL account denomination (e.g. all records of “612100 - Use GSM” are attributed to the FLAG object “CP_SOGFTE_cc” where cc is the cost center of the SAP record)
- attribution based on SAP details: this is for example the case for GL 611120 – Maintenance infrastructure national contracts; drilling down into SAP records allow to separate IT maintenance and network equipment maintenance.

A variety of destination objects receive costs from GL61 accounts: IT cost objects, Network cost objects and HR driven cost objects.

For the first category of GL61 accounts, the attribution is reported at the level of CostCenter/GL account and for the second category the attribution is reported at GL account level. This is why in this last case, the GL61 costs are grouped in ITN_SOG_POOLS aggregating the cost centers.

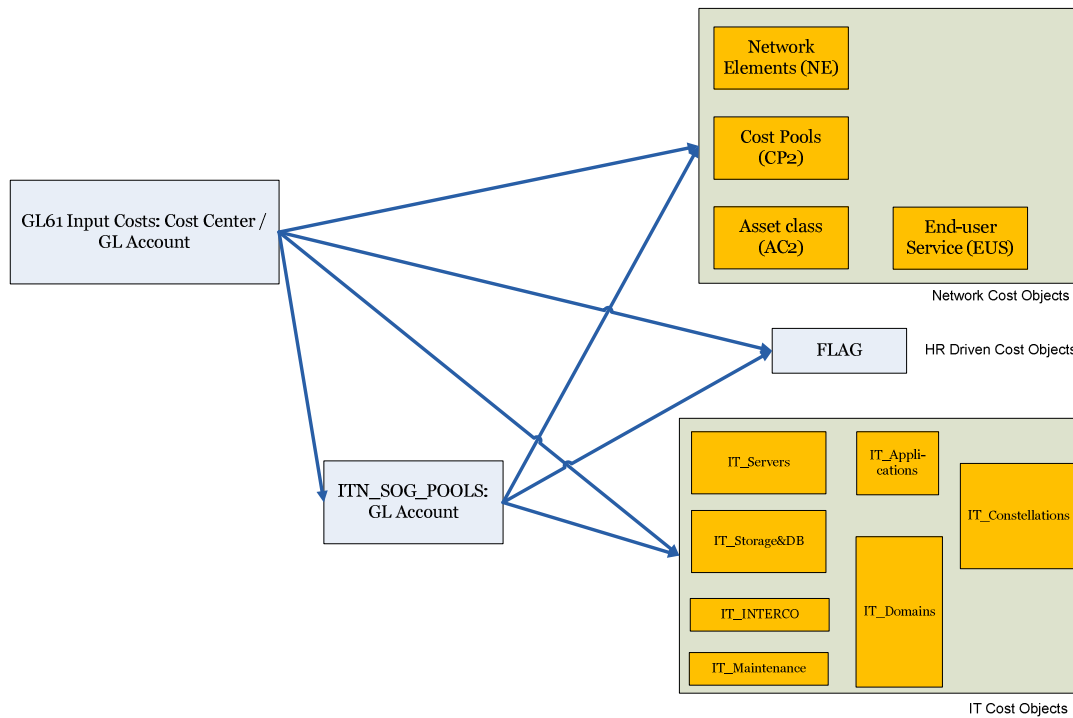


Figure 7

5.1.2 GL62 accounts – Wages costs

The GL accounts in the 62 range register remuneration costs of salaried staff and manual workers, premiums, social security, bonus etc. Again, these costs are registered per cost center thereby mixing IT staff and non IT staff. The allocation process of OPEX wages cost is processed through a cascade with a particularity on the range of data taken into account for key creation. All costs from the cost base were used to create the keys but the cost base the keys were applied on only take into account SDE minus a few cost centers from COP treated in the ABC model. This was done in order to be coherent with the organizational structure of SDE

Step 1-

The allocation stream of wages costs first aggregates the input data into two categories of cost pools (very similar to cost pooling in the ABC model but at the level of cost center):

per level remuneration cost pools:

- CostCenter / 6201 - level1
- CostCenter / 6202 - level2b
- CostCenter / 6203 - level2a
- CostCenter / 6204 - level3&4

corrective remuneration cost pools:

- CostCenter / 6206 - All levels
- CostCenter / 6213 - Correction personnelcost

CostCenter / 6291 - Transfert of TGR cost

CostCenter / 6299 - Total remuneration – dummy

Step2 –

The corrective cost pools are allocated to the per level remuneration cost pools:

Cost Pool	Destination	allocation driver
CostCenterX / 6299 Total remuneration - dummy CostCenterX / 6206 All levels		
	CostCenterX / 6201-level1	remuneration cost
	CostCenterX / 6202-level2b	remuneration cost
	CostCenterX / 6203-level2a	remuneration cost
	CostCenterX / 6204-level3&4	remuneration cost
CostCenterX / 6291 transfer of TGR cost	CostCenterX / 6201-level1	Direct
CostCenterX / 6213 Correction personnelcost	CostCenterX / 6201-level1	Nbr FTE
	CostCenterX / 6202-level2b	Nbr FTE
	CostCenterX / 6203-level2a	Nbr FTE
	CostCenterX / 6204-level3&4	Nbr FTE

Step3 –

The per level remuneration costs are split over the SDE (new ITN) teamgroups based on the number of FTE of each level in each teamgroup. Indeed, to allow the separation of IT and nonIT remuneration costs, we need to drill down to the level of teams.

32 teamgroups have been defined of as management (overhead) teams (dedicated to management tasks) and 196 executive teams.

Management and executive teams must be separated since the cost drivers are different:

- management team costs are related to the span of control in a structured organisation which is reflected by the number of managed teams and the headcount within these teams
- executive team costs are related to the Network or IT tasks.

The following drawing shows the management hierarchy considered in the model to measure the span of control of the management teams for SDE (for illustration purposes).

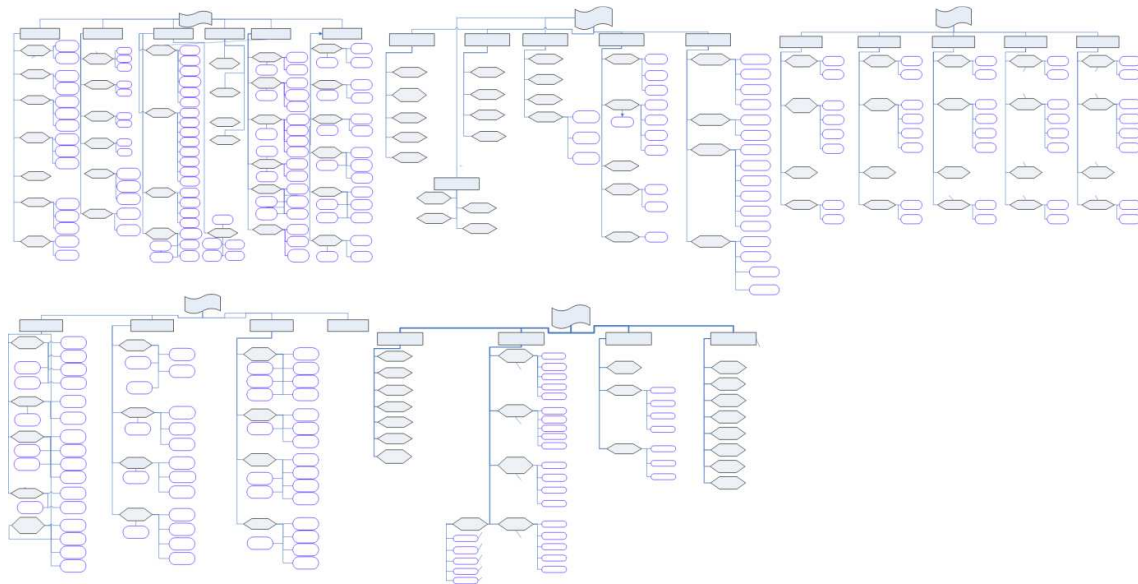


Figure 8

Step4-

A fourth step is introduced to “cascade” the costs of the overhead teams (management) onto the productive (productive_overhead and productive_executive) teams managed by them. The output objects of these 4 steps are defined in the module “OperationalDriven_HR_CP”, each object being an executive teamgroup. At this point in the allocation stream a neat separation can be done between IT related costs (IT teamgroups) and nonIT related costs (nonIT teamgroups).

The four steps of wages allocation are summarized in the following allocation stream:

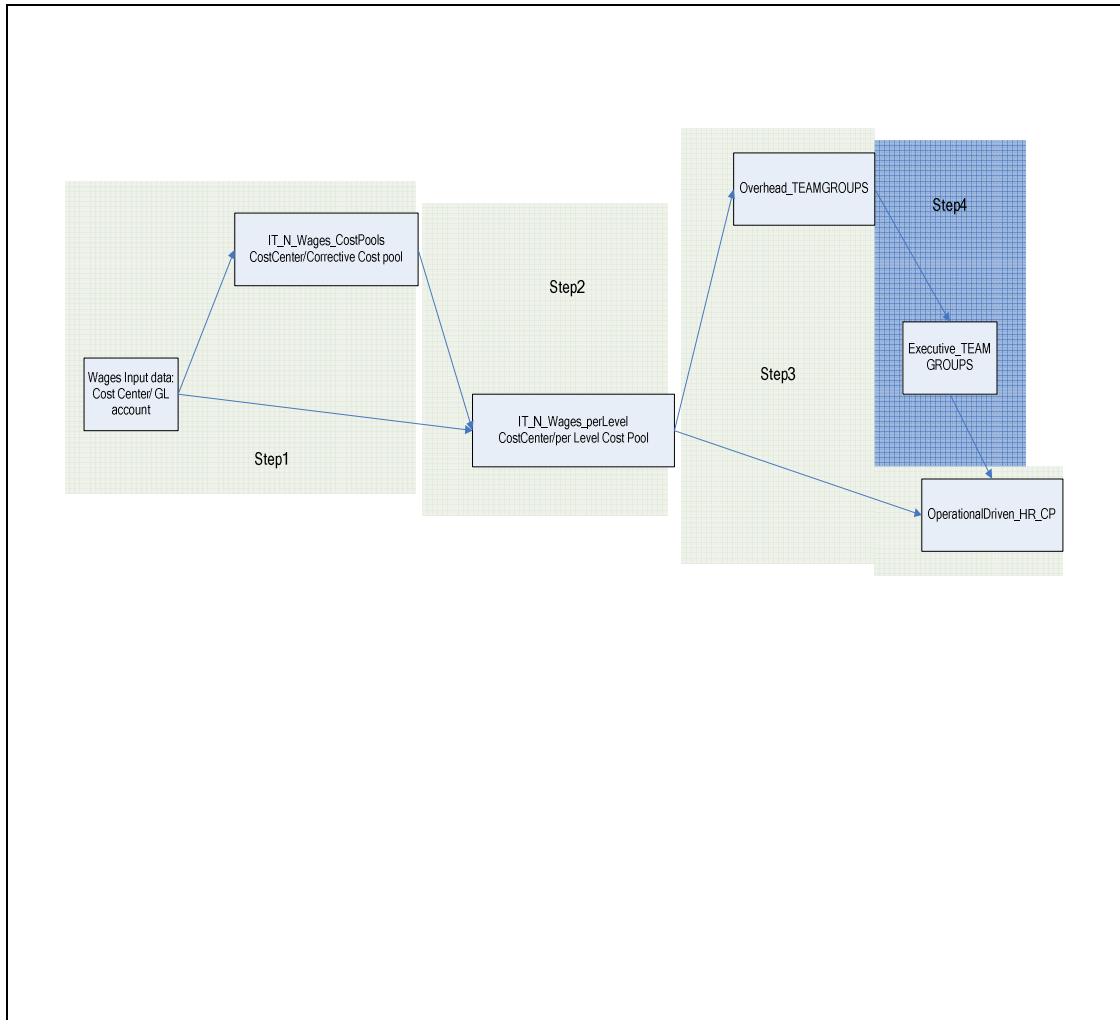


Figure 9

5.1.3 GL60 accounts – Material Out of Stock

The GL60 account costs cover the cost of all kinds of material taken out of the stocks of Belgacom and used for the repair of network or the cost of small items (office material, GSM,...) consumed by the staff in the context of their daily activities.

Note that movements from stock also occur for the construction of the network; these costs are capitalized. From SAP-MM, it is possible to filter out the movements to be capitalized and the others. The capitalized MOS costs are implicitly treated with the assets.

MOS costs are reported at GL account level per cost center.

This level is too high to allow an accurate attribution of the costs to the model cost objects and therefore an analysis is performed at the SAP-MM record level.

- The SAP records are reported among other detailed information such as the Material Item Number, where the amounts can be directly attributed to a cost object of the cost model based on the description of the material item.

Around 9000 different Material Items are analysed; each item is directly attributed to a model cost object.

This analysis results in two kinds of model cost objects: network related cost pools (CP1 module objects) and manpower related cost pools (FLAG module objects MOSFTE_per_cc).

Once each material item is attributed to a cost object, it is easy to report an allocation from the CC/GL account aggregate to the model cost objects.

5.2 Allocation of teamgroups to NW activities

1° NW activity categories

- We distinguish 13 different categories of NW activities in Network Process:
 - Activities linked to NW Infrastructure Engineering
 - Activities linked to NW Product & Service Engineering
 - Activities linked to NW plant works and document
 - Activities linked to NW Inside Installation
 - Activities linked to NW Outside Construction
 - Activities linked to Copper related work
 - Activities linked to VHR, Video and Radio related work
 - Activities linked to NW Infrastructure Remote Configuration
 - Activities linked to NW Service Remote Configuration
 - Activities linked to NW Customer Service Fault Handling & Remote Repair 2nd line
 - Activities linked to NW Service Maintenance & Remote Repair 3rd line
 - Activities linked to NW Infrastructure Maintenance and Remote Repair 3rd line
 - Activities linked to NW Infrastructure Monitoring
- For the purpose of OPEX cost allocation of SDE, the department REG has grouped all SDE teams (NW and IT) into three types of teamgroups:
 - Productive_Executive teamgroup,
 - Productive_Overhead teamgroup,
 - Management teamgroup.
- Productive_Executive teamgroup has been assigned with NW activities for which it's mainly responsible.

- IT related Productive_Executive teamgroups have not been assigned with IT activities. Their OPEX costs are allocated to IT Constellations as described in chapter 6.1.4.2 Operational Costs:.
- One exception is that two teamgroups of SDE IDO have been assigned with the activity 7.1.5. IT Housing Data Center for Customer (IDO-TRS²-DC-INS, IDO-TRS²-DC-OP, IDO-OPE-DC). The cost allocation is described in chapter 6.2 Allocation of IT constellations.
- Productive_Overhead teamgroups provide support to Productive_Executive teamgroups.
- Management teamgroups manage Productive_Overhead teamgroups and Productive_Executive teamgroups.

2° Allocation of Productive_Executive teamgroups to NW activities

Division	Productive_Executive Teamgroup	Driver	Activity
[50_SDE]	COP-CFO1-CAB	Cable provisioning DUs	[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]
[50_SDE]	COP-CFO1-CAB	Cable repair DUs	[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]
[50_SDE]	COP-CFO2-CAB	Cable provisioning DUs	[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]
[50_SDE]	COP-CFO2-CAB	Cable repair DUs	[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]
[50_SDE]	COP-CFO3-CAB	Cable provisioning DUs	[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]
[50_SDE]	COP-CFO3-CAB	Cable repair DUs	[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]
[50_SDE]	COP-CFO4-CAB	Cable provisioning DUs	[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]
[50_SDE]	COP-CFO4-CAB	Cable repair DUs	[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]
[50_SDE]	COP-CFO5-CAB	Cable provisioning DUs	[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]

[50_SDE]	COP-CFO5-CAB	Cable repair DUs	[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]
[50_SDE]	IDO-FX3-BND-IDE-VHR	Direct	[5.2.9. NW Plan outside plant works, Solution design & Engineering for VHR/Industrial zonings (IDO-FXx-BND-IDE-VHR)]
[50_SDE]	IDO-FXx-BND-EQE	# Equivalent FTE	[5.2.1. NW Plan Backbone Inside plant works and document (IDO-FXx-BND-EQE)]
[50_SDE]	IDO-FXx-BND-EQE	# Equivalent FTE	[5.2.2. NW Plan Access Inside plant works and document (IDO-FXx-BND-EQE)]
[50_SDE]	IDO-FXx-BND-IDE	Direct	[5.2.8. NW Plan outside plant works and document (IDO-FXx-BND-IDE)]
[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE	[5.2.3. NW Backbone Inside Installation (HW or SW) (IDO-FXx-IMR-xxx)]
[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE	[5.3.1. NW Backbone Inside Maintenance & Repair (IDO-FXx-IMR-xxx)]
[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE	[5.3.2. NW Access Inside Maintenance & Repair (IDO-FXx-IMR-xxx)]
[50_SDE]	IDO-FXx-LPE-xxx	# Equivalent FTE	[5.2.10. NW (Supervision, coordination and inventory) Outside construction (IDO-FXx-LPE-xxx)]
[50_SDE]	IDO-FXx-LPE-xxx	# Equivalent FTE	[5.3.3. NW (Supervision, coordination and inventory) Outside Maintenance & Repair (IDO-FXx-LPE-xxx)]
[50_SDE]	IDO-FXx-OPT-OUT	Direct	[5.3.4. NW Access Outside Maintenance & Repair FO, ROP (IDO-FXx-OPT-OUT)]
[50_SDE]	IDO-FXx-OPT-Radio	# Equivalent FTE	[5.2.11. NW Access Outside Video event (IDO-FXx-OPT-Radio)]

[50_SDE]	IDO-FXx-OPT-Radio	# Equivalent FTE	[5.3.5. NW Access Outside Maintenance & Repair VHR, Radio (IDO-FXx-OPT-VHR, IFO-FXx-OPT-Radio)]
[50_SDE]	IDO-FXx-OPT-VHR	# Equivalent FTE	[5.2.12. NW Access Outside VHR for customer (IDO-FXx-OPT-VHR)]
[50_SDE]	IDO-FXx-OPT-VHR	# Equivalent FTE	[5.3.5. NW Access Outside Maintenance & Repair VHR, Radio (IDO-FXx-OPT-VHR, IFO-FXx-OPT-Radio)]
[50_SDE]	SDV-NIE-CAT	Direct	[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]
[50_SDE]	SDV-NIE-CPE	Direct	[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]
[50_SDE]	SDV-NIE-DOT	Direct	[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]
[50_SDE]	SDV-NIE-LAB	Direct	[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]
[50_SDE]	SDV-NIE-PLE	Direct	[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]
[50_SDE]	SDV-PSE-DAC	Direct	[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]
[50_SDE]	SDV-PSE-VID	Direct	[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]
[50_SDE]	SDV-PSE-VNC	Direct	[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]
[50_SDE]	SIO-CSC-NOC_NW	Direct	[5.3.11. NW Infrastructure Monitoring (SIO-CSC-NOC excl. ITMON)]
[50_SDE]	SIO-CSC-SSD	Direct	[5.3.7. NW Customer Service Fault Handling & Remote Repair 2nd line (SIO-CSC-SSD)]
[50_SDE]	SIO-INO-DSP	# Equivalent FTE	[5.2.7. NW Data&TV&CDR Service Remote Configuration (SIO-INO-DSP)]
[50_SDE]	SIO-INO-DSP	# Equivalent FTE	[5.3.9. NW Data&TV&CDR service level Maintenance & Remote Repair 3rd line (SIO-INO-DSP)]

[50_SDE]	SIO-INO-TIO	# Equivalent FTE	[5.2.5. NW Infrastructure Remote Configuration (SIO-INO-TIO)]
[50_SDE]	SIO-INO-TIO	# Equivalent FTE	[5.3.10. NW Infrastructure Maintenance and Remote Repair 3rd line (SIO-INO-TIO)]
[50_SDE]	SIO-INO-VSP	# Equivalent FTE	[5.2.6. NW Voice Service Remote Configuration (SIO-INO-VSP)]
[50_SDE]	SIO-INO-VSP	# Equivalent FTE	[5.3.8. NW Voice service level Maintenance & Remote Repair 3rd line (SIO-INO-VSP)]

Productive_Executive teamgroups are mainly allocated to NW activities as follows:

- direct allocation, if a teamgroup has been assigned with only one activity. This is the major case for SDE SDV teamgroups.
- on the basis of the work hours performed, if a teamgroup having been assigned with more than one activity. The reporting systems used are CLARA for SDE COP CFO CAB teamgroup, ABB for SDE SIO teamgroups and LEAD, JMS and CANVAS for SDE IDO teamgroups. Those work hours have been translated into the different driver quantities by taking into account standard time per activity:
 - DUs as driver quantity for SDE COP CABLE teamgroups.
 - Mandays as driver quantity for SDE SDV teamgroups for network engineering activity and product engineering activity.
 - Equivalent FTEs as driver quantity for SDE IDO teamgroups for network field construction activities and network field repair activities.
 - Equivalent FTEs as driver quantity for SDE SIO teamgroups for network remote configuration activities and network remote repair&maintenance activities.

6 IT stream

6.1 IT delivery

6.1.1 IT Sub-Model: Introduction to the Allocation :

The IT costs are those incurred by the company for the use of programs with a specific infrastructure to deliver a requested service or product to the end-user (which can be a Belgacom Client or a Belgacom Employee). In Telecommunications, rarely will we encounter an Application that is exclusively being used by one product. Most of the time, one application will be used by many different products. Therefore, the goal of this model is to regroup all capitalized and operational costs within clusters of applications that have been defined so that the link to products can easily be made.

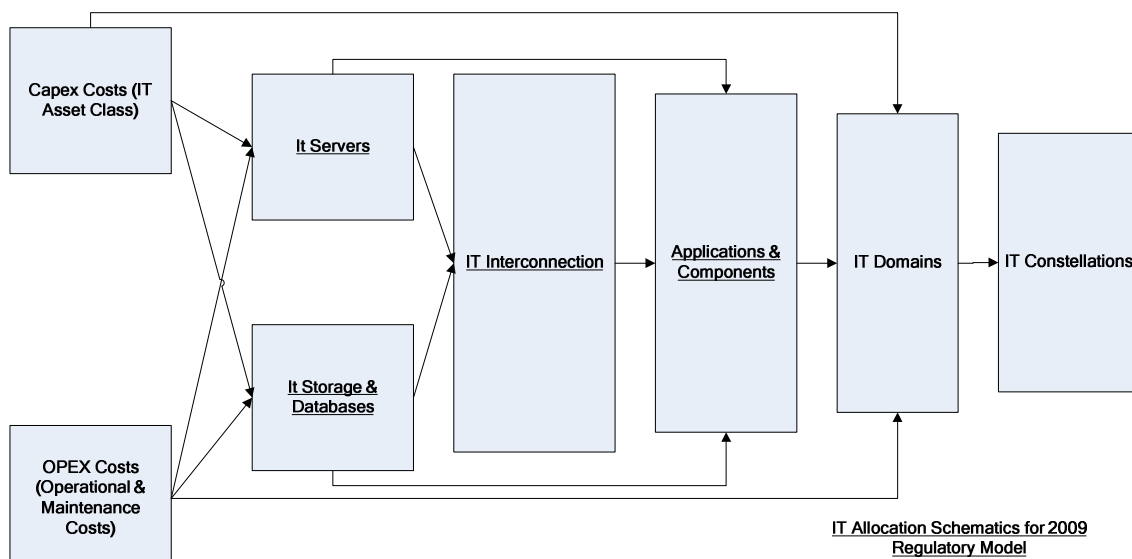


Figure 10

Reporting systems and inventories either report to an application and its component or to an IT Domain. Among more than a thousand applications, IT engineering defined 282 Domains for reporting purposes and their definition were adapted into the IT Sub-Model in order to give coherence over the years, since both naming convention and reporting systems changed frequently. Both of these Applications and Domains are then pooled into an aggregate serving the same purposes which are called IT Constellations. The allocation stream goal is to link applications, components and domains to the manpower and infrastructure costs that are used in order to create and run and maintain them.

These costs can be of two different types: capitalized and therefore depreciated following accounting rules (for IT, depreciation length is mostly 4 or 5 years), or operational and fully charged for the current year. Depending of the cost's nature, the allocation stream will follow a different path and use different inventories and reporting systems in order to create the optimal allocation keys.

6.1.2 Data sources: IT Inventories and Reporting Systems:

6.1.2.1 Infrastructure and Hardware Inventory:

The hardware layer of the IT Infrastructure within Belgacom is composed of a server park, a storage facility and an intranet required to interconnect them. For Servers allocation, three inventories were used to populate the park and gain depth in their use. Regarding Storage, the reporting system can extract all directories paths names on Belgacom's hard-drives with the storage space it uses.

6.1.2.2 Internal IT Databases:

A number of databases are available and have been used as reporting on applications , databases, computing platforms , their relationships and their usage :

- Configuration management database
- IT Asset management
- Business modeling database
- Identifier management system for IT applications

6.1.2.3 Reporting Systems:

A specific tool (RAPID) is available to report on projects, budget and capacity management related processes, with interfaces to other core systems such as SAP HR (human resource & organization units data) , SAP Finance (actual, purchase order..), IMD (release Management) and timesheets applications (used by SDE to report their day-to-day work). The tool is used to calculate allocation keys for most manpower costs for SDE, Capex and Opex.

Regarding maintenance and contractors, a repository is maintained within SDE with all financial details (actuals, general ledger account n°, cost center...) as well as vendors details (name of the product vendor and the subcontractor, contract name...).

6.1.3 Modules and Objects composing the IT Sub-Model

6.1.3.1 IT Servers

A server is a computer running as a service to serve the needs or requests of others programs or users. They are bought off several vendors which use different technology types. These machines are upgraded on a frequent basis in terms of memory, cpu cache and quantity or i/o cards. This results in a heterogeneous park of servers, even for a similar model sold by the same vendor, having a negative effect in terms of cost variance. Therefore , the servers have been split in different families based on their technology. Splitting the server asset between these families was possible by the use of a specific reporting that is done yearly by Finance.

6.1.3.2 Storage

In the storage tool, reported directories paths have been assigned the name of an application or a database in their path. It allows us to know precisely the amount of storage used by each application, database or another object in the sub-model.

6.1.3.3 IT Interconnection

a) Connect IT:

Connect IT is the Intranet used by the IT infrastructure in order to inter-connect the different objects it uses to deliver a service. The allocation will be based on a post-process generic key defined by the CAPEX cost of servers. Since there is a direct correlation between a server's cost and the data it sends and receives (through its i/o card which is one of the main contributors to a server's cost).

b) Application Interaction Platform:

The Application Interaction Platform object is defined as the software layer required to interconnect Belgacom's complex IT infrastructure.

c) IT Overhead

The overhead object is a pool of costs that manages the Belgacom's IT Infrastructure.

6.1.4 Allocation Process for IT Assets and Operational Costs:

6.1.4.1 IT Assets

There are two types of IT assets : Hardware and software assets.

6.1.4.1.1 Hardware asset classes :

Within the hardware assets , the most important ones collect the investments in servers, storage, Office automation , IT network .

Server assets are used by applications (software sold by a vendor or developed in-house) and by databases or for even interconnectivity and security. These assets pool most of servers families used within the company.

The costs of these assets are allocated into families of servers based on purchasing information allowing to attribute a weight to each server, and based on an inventory of servers per family.

Storage assets collect investments required in order to run applications and databases, create backup and archives to save an employee's work or customer's information (regarding billing or call details records for instance).

IT Internal Network assets aggregate the investments pertaining to the internal IT network required to support the needs of employees as well as the interconnection needed in order for the different IT objects to communicate. These costs are integrally allocated to the Connect-IT object.

Office Automation assets aggregate investments to improve productivity such as laptops, desktops, development environment, mails exchange platform, printing servers etc. These costs are directly sent to the IT_OfficeAutomation constellation.

Datacenters assets IT costs are pooled in this Asset. The number of physical servers running in those datacenters for each IT object was used as an allocation key to ventilate these costs.

6.1.4.1.2 Software asset classes :

There are currently about 30 different asset classes for applicative software. Each class is the collection of internal well identified applications; the cost of each class is allocated towards one or several IT constellations either directly (100%) when the collection of underlying applications fits completely in a IT constellation, or using a driver that is the number of capitalized development FTEs per underlying application during the last 5 years (depreciation period). These FTE effort values are gathered from historical data in the financial reporting system, and allow to relate development FTE precisely to an application.

6.1.4.2 Operational Costs:

IT maintenance is one of the main contributors of operational costs. All other costs are the ones that are not maintenance related nor capitalized in the previous assets. The methodology followed is different from the one used to allocate capitalized costs as explained previously.

Operational costs are extracted from SAP by Finance and are reported by cost centers. As they may regroup employees working on different tasks, as well as using a structure that may not be close to

reality in all cases following the integration of Belgacom's subsidiaries, a functional approach was adopted in order to match the field's reality of the SDE division. This introduces the concept of Functional Domains, an acronym created for each level 3 team, which is generally a deep enough level to know precisely what is done by these teams. The mapping between cost centers and functional domains was done by Finance, as it used to report mandays to the system in a functional way. It was adapted by the Regulatory team in order to give more consistency to the data in aggregating some functional domains, or splitting them further more when needed (for instance: the monitoring department is shared by the IT monitoring team and the network monitoring team). RAPID reports mandays per functional domain and cost center with details regarding which IT or Network objects are impacted. All Opex mandays from Belgacom employees reported in RAPID for 2009 will be used as keys to distribute costs per IT domain. The first step is to split the functional domains by type: they can be IT or Network related. There are 25 functional domains reporting costs in the IT sub-model.

Maintenance Costs is the other source of operational costs. A report provided by the department managing maintenance contract was used to map all costs to an IT object in the model. Maintenance can be related to server's maintenance as well as application's.

6.1.5 Applications to Constellations

a) IT Applications

The IT applicative layer is composed of applications or software being used by either an end-user (such as an employee or a customer) or by a service (such as an inventory or a billing system). There are more than 1000 applications that have been bought off a vendor and adapted to suit the company's needs or developed internally by Belgacom's IT developers. Over the years, these applications have been updated, replaced, renamed or outphased. Applications and their dependencies are reported in the IT configuration inventory with their acronym, their fullname and their description, allowing us to link them to constellations.

b) IT Domains

IT Domains are created by IT engineering and is a helpful means to both report IT manhours and to regroup IT applications into functional blocks. In terms of reporting, RAPID assigns reported hours to an IT domain instead of an application. This stage is therefore essential to the allocation of OPEX IT manhours.

c) IT Constellations

IT Constellations are the ultimate IT objects of the IT sub-model: it is the bridge between the sub-model and the products. The following constellations were created in order to group all IT costs in an end-object.

For each of them, a specific allocation key is used in order to allocate costs to products. Further details regarding the allocation of constellations can be found in part 6.2

6.2 Allocation of IT constellations

IT_CONSTELLATION	Driver
7.1.1. End user support for BGC SA employees (IT)	Generic key: total wages cost
7.1.3. End user support for external customers (IT)	direct
7.1.5. IT Housing Data Center for Customer (IDO-TRS ² -DC-INS, IDO-TRS ² -DC-OP, IDO-OPE-DC)	revenue
7.2.1. Manage implementation and support of new or modified IT applications(20_FIN)	direct
7.2.1. Manage implementation and support of new or modified IT applications(20_GHQ)	direct
7.2.1. Manage implementation and support of new or modified IT applications(40_CWS)	direct
7.2.1. Manage implementation and support of new or modified IT applications(79_BSF)	direct
IT_BelgacomMobile	direct
IT_BICS	direct
IT_Billing	Generic key: Process 4 costs on ABC_PRODUCTS except activity 4.5.1. Manage IBIS-related national inter-carrier billing problem handling, production & collection
IT_Billing_Voice_Retail&Wholesale	number of call (internal, external, freephone all included)
IT_Billing_Wholesale	Generic key: cost on ABC_PRODUCTS of activity 4.5.1. Manage IBIS-related national inter-carrier billing problem handling, production & collection
IT_Business_Intelligence	Generic key: cost of all ABC products
IT_CRM	number of subscription (external only)
IT_ERP	1/3 to BA&activity "9.1.1. Provide financial services"; 1/3 to BA&activity "8.1.1. Provide HR services"; 1/3 to BA&each activity of (subprocess) 6.1. Supply Chain Management
IT_ERP_BI	Generic key: cost of all ABC products

IT_ERP_Common	1/3 to BA&activity "9.1.1. Provide financial services"; 1/3 to BA&activity "8.1.1. Provide HR services"; 1/3 to BA&each activity of (subprocess) 6.1. Supply Chain Management
IT_ERP_CRM	number of subscription (external only)
IT_ERP_FIN	to BA&activity "9.1.1. Provide financial services"
IT_ERP_HR	to BA&activity "8.1.1. Provide HR services"
IT_ERP_LOG	to BA&each activity of (subprocess) 6.1. Supply Chain Management
IT_EUC	Generic key: total wages cost
IT_fulfillment_BRIO_CPS&NumberPortability	request volume
IT_fulfillment_BRIO_CPS	direct
IT_Fulfillment_Explore	provisioning volume
IT_Fulfillment_LeasedLines	EUS_LL provisioning volume
IT_Fulfillment_NumberPortability	50% to "21202 Nat. Number portability Access per line"; 50% to "11131 Traff. Outg.MOLO"
IT_Fulfillment_PIA	provisioning volume (number of connection)
IT_Fulfillment_PILA	(de)provisioning volume
IT_Fulfillment_PILA_Retail	provisioning volume (number of connection)
IT_Fulfillment_Transport	provisioning volume
IT_Garbage	direct
IT_IDTV	direct
IT_Inventory_CableInfrastructure	to activity "5.2.8. NW Plan outside plant works and document (IDO-FXx-BND-IDE)"
IT_Inventory_Data	25% to "CP_DSLAM"; 25% to "CP_ATM_Equipment"; 25% to "CP_IPVPN_equipment"; 25% to "CP_EthernetMPLS_equipment"
IT_Inventory_DIM	revenue
IT_Inventory_Ethane	direct
IT_Inventory_LocalLoop&Transmission	Generic key: CAPEX of following NEs (GROUP_TECHNOLOGY=(D)WDM,SDH,Ethernet,PDH,MWE,CopperPlant)
IT_Inventory_LocalLoop	direct
IT_inventory_PSTN/ISDN	direct
IT_Inventory_Transmission	Generic key: CAPEX of following NEs (GROUP_TECHNOLOGY=(D)WDM,SDH,Ethernet,PDH,MWE)
IT_Inventory_Voice	direct

IT_JMS	90% to activity "5.2.10. NW (Supervision, coordination and inventory) Outside construction (IDO-FXx-LPE-xxx)"; 10% to activity "5.3.3. NW (Supervision, coordination and inventory) Outside Maintenance & Repair (IDO-FXx-LPE-xxx)"
IT_MediationDevice_DSLAM	direct
IT_Office_Automation	Generic key: total wages cost
IT_Payphone	direct
IT_Security	Generic key: total wages cost
IT_ServiceAssurance	subscription (internal and external) volume
IT_ServiceAssurance_Data&Transmission	Generic key: CAPEX of following NEs (GROUP_TECHNOLOGY=(D)WDM,SDH,Et hernet,PDH,MWE,CopperPlant)
IT_ServiceAssurance_Explore	site (subscription) volume
IT_ServiceAssurance_Internet	direct
IT_ServiceAssurance_LeasedLines	subscription (EUS_LL) volume
IT_ServiceAssurance_PIA	subscription (internal and external) volume
IT_ServiceAssurance_PIA_Retail	subscription (internal and external) volume
IT_ServiceAssurance_PILA	subscription (internal and external) volume
IT_ServiceAssurance_Transport&Wholesale	subscription (internal and external) volume
IT_ServiceAssurance_Voice	direct
IT_SKYNET	direct
IT_Skynet_Billing	direct
IT_Telindus	direct
IT_WFM	DU volume

We distinguish mainly 12 different categories of IT Constellations:

- IT Constellation directly linked to IT Process
- IT Constellation providing support to Subsidiaries
- IT Constellations providing support to Customer Relationship Management (CRM)
- IT Constellations providing support to Business Intelligence analysis work
- IT Constellations providing support to Fulfillment Process
- IT Constellations providing support to Assurance Process
- IT Constellations providing support to Billing Process
- IT Constellations providing support to ERP (Enterprise Resource Planning)
- IT Constellations providing support to internal IT usage
- IT Constellations providing support to Network Inventory
- IT Constellations providing support to Work Force Management (WFM)

- IT Constellation providing support to a specific ABC product

1° IT Constellation directly linked to IT Process

The costs are mainly allocated as follows:

- directly to one Management activity,
- directly to one product,
- based on product revenue.

2° IT Constellation providing support to Subsidiaries

The costs are mainly allocated as follows:

- directly to “30000 Subsidiaries & externals” product.

3° IT Constellations providing support to Customer Relationship Management (CRM)

The costs are mainly allocated as follows:

- sent to product based on product external subscription volume.

4° IT Constellations providing support to Business Intelligence analysis work

The costs are mainly allocated as follows:

- sent to product based on product OPEX cost (except COGS).

5° IT Constellations providing support to Fulfillment Process

The costs are mainly allocated as follows:

- sent to product based on product provisioning volume.

6° IT Constellations providing support to Assurance Process

The costs are mainly allocated as follows:

- sent to product based on product external/internal subscription volume.

7° IT Constellations providing support to Billing Process

The costs are mainly allocated as follows:

- sent to product based on cost of billing related activities cost,
- sent to product based on product traffic volume.

8° IT Constellations providing support to ERP (Enterprise Resource Planning)

The costs are mainly allocated as follows:

- sent, in average, to relevant Management and Support activities.

9° IT Constellations providing support to internal IT usage

The costs are mainly allocated as follows:

- sent to product based on product WAGES cost.

10° IT Constellations providing support to Network Inventory

The costs are mainly allocated as follows:

- directly sent to one network object,
- sent to, in average, relevant network objects,
- sent to network object based on network object CAPEX cost,
- sent to, based on defined %, Network activities,
- sent to product based on product revenue.

11° IT Constellations providing support to Work Force Management (WFM)

The costs are mainly allocated as follows:

- sent to product based on executed provisioning and repair DUs for product.

12° IT Constellation providing support to a specific ABC product

The costs are mainly allocated as follows:

- directly sent to specific product.

Cost of all IT Constellations are allocated to either ABC Products, Business Primary activities, Management Activities, Support Activities, NW Primary activities or NW objects. All these are processed in “IT_Constellations & Process 7” box (ref to Figure 2: Graphic representation of the Belgacom Regulatory Cost Model 2009) and ending in cost objects of different modules.

7 Network stream

The network allocation stream is organized around the network investment structure (leading to network functional blocks in the allocation stream) as opposed to the ABC allocation flow which is organised around the business and support activities (Activity based costing). For the network stream the focus is on Capital Expenditure costs which are directly associated with the network equipment deployed ; these costs originate from the assets accounting system of Belgacom and they are gradually cascaded by means of a variety of cost deaggregation keys and a variety of cost drivers up to the telecommunication services. By contrast, the ABC stream focuses on the operating expenditures of the business activities, which are directly allocated to end-products by means of business drivers. The allocation cascade of the network building blocks is presented in section 7.1.

For the operating costs of the network itself however, an intermediate allocation approach is used : the remuneration costs and the personnel related OPEX costs are associated to typical network activities (as described in section 5.1 and in section 5.2) which are finally attributed to network functional blocks . This part is discussed in section 7.10 hereafter .

7.1 A layered allocation model

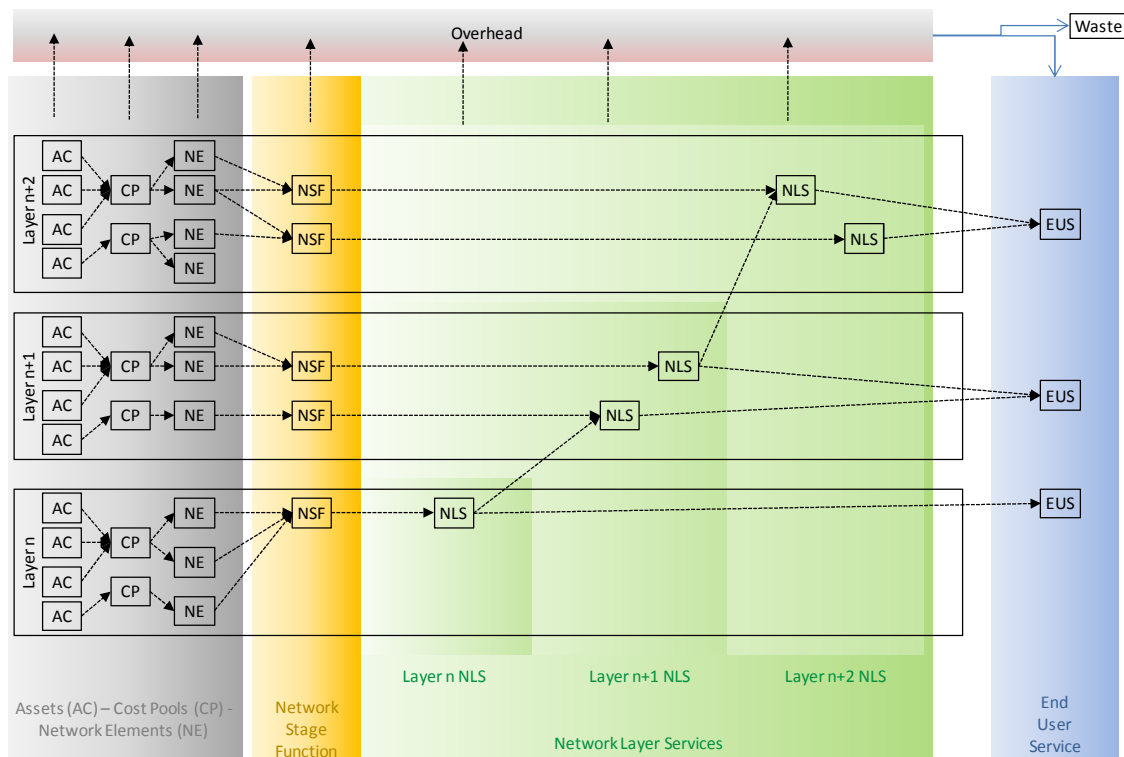


Figure 11 - Layered allocation model

It is common practice in the telecommunication industry to separate investments in different logical levels, lower levels corresponding to basic (simple and general purpose) services, higher levels corresponding to complex higher valued and purpose oriented services. The pursued effect of such separation is to promote the reuse of basic lower level services by higher level services thereby bringing in the short term the volumes at each layer to levels that benefit from economies of scale. In the long term, the pursued effect is to benefit also from economies of scope.

The network cost allocation model is designed to reflect the layered functional structure of Belgacom's telecommunication infrastructure, each layer offering services to the upper layers. In practice, 6 layer levels are represented in the cost allocation model in order to allow each invested technology to be situated at the right level of its contribution in implementing the layer services.

In practice, a network equipment may participate to several different layers especially in the interfacing boards towards other network equipment because it acts as a terminating point of lower level layer services; for example an IP router interface typically implements ATM specification (for the ATM Virtual Circuits terminating in the equipment) as well as SDH specification (for the termination of Virtual Containers transporting ATM Virtual Circuits).

To avoid any ambiguity, a network equipment will be considered as belonging to the highest layer implemented in it and operated by it. For the example of the IP router, this simple criterium locates an IP router on the third layer (IP layer) above ATM and SDH.

Using this criterium all investments still in service of Belgacom's infrastructure are distributed in one of the following layers:

Layer NLS1.0 : Passive infrastructure gathering investments in access copper, in ducts and fibre cables (access and backbone).

Layer NLS1.1 : Active optical networking infrastructure gathering investments in WDM, DWDM technology.

Layer NLS2.0 : Active transmission infrastructure based on Time Division Multiplexing technology gathering investments in PDH, SDH.

Layer NLS2.1 : Active data infrastructure based on Packet Based technology gathering investments in ATM, Ethernet/MPLS.

Layer NLS3 : Active data infrastructure based on IP technology gathering IP routers, IPVPN routers.

Layer NLS4.0 : Active application infrastructure based on a variety of technologies gathering applicative equipment like telephony digital switches, VoIP platforms, Intelligent Network platforms, Broadcast TV platforms, Video on Demand platforms.

In the model (see Figure 11 - Layered allocation model), layers are represented by a number of "standard" services (referred to in the sequel as Network Layer Services – NLS) offered to upper layers or directly used as retail/wholesale products (End User Services – EUS). In turn the services offered by a layer are the result of the combination of layer specific functions (referred to as Network Stage functions – NSF) and services offered by lower level layers allowing the layer specific functions to interact with each other.

Layer n--layer n+1 cost allocation mechanism:

Each layer represented in the model produces the defined NLS services with a certain amount of volume (the service amount); this amount is “consumed” by the upper layer services and it is used as a driver to allocate the costs to the consumer services in the upper layers.

Layer cost allocation cascade:

The 6 defined layers are put one after another according to their level generating a cascade of cost allocation mechanism (see Figure 11 - Layered allocation model).

Each layer is discussed in a specific chapter of this documentation.

Establishing costs of the Network Stage Functions

The “network stage functions” (NSF) are the direct constituents of a layer ,they are intermediate network building blocks providing well defined logical network functions specific to that layer (also called network functional units) . A Network Stage Function can be limited to a node or it can be a cluster (distributed function) corresponding to “network stages” : access stage (functional cluster including all customer sites and the central offices), backbone regional stage , backbone core stage, backbone express stage . A network stage function is characterized by the amount of function it produces (volume).

Network Stage Functions are implemented in equipment , but the corresponding investment values are not always directly identifiable in the asset structure of Belgacom : for example some assets aggregate investments per technology (not per function in the network) , some other do not cover the totality of a given technology due to the history of the accounting asset structure in SAP (reorganization of assets, transfers between assets, closing of asset classes and opening of new ones) .

Different methods are used and combined to constitute the investment costs of Network Stage Functions :

1. Aggregation of assets in a larger asset or a cost pool in order to gather investments of same technology and align them with operational inventories.
2. Deaggregation of cost pools in network elements : this step decomposes cost pools into network elements; a network element corresponds to an entire physical equipment as deployed in the Belgacom infrastructure. Operational inventories of pieces of equipment and component prices are used.
3. Direct allocation of assets or cost pools to network elements when the assets or cost pools are directly identifiable with a network element of the model.
4. Composition of the network elements to form a network stage function covering one of the stages.

The stepwise combination of these methods are discussed in the next section.

7.2 From Assets to Network Stage Functions.

Next table gives the list of the 84 NSF present in the network allocation flow.

Layer	Layer Name	NSF_Name	NSF short description
Layer	L1_PASSIV	NSF_Access_to_Backbone_fibre	physical access in central site to the backbone fibre

1.0	E		
Layer 1.0	L1_PASSIV	NSF_Access_to_copper_pairs_inTechnical Building	physical access in central site to the copper pairs of outside copper plant
Layer 1.0	L1_PASSIV	NSF_Access_to_distribution_pairs_inStreet	physical access in street site to the copper pairs towards customers
Layer 1.0	L1_PASSIV	NSF_Access_to_feeding_pairs_inStreet	physical access in street site to the copper pairs towards central site
Layer 1.0	E	NSF_Split_Copper_Signal	split narrowband and broadband signals in a copper pair
Layer 1.0	L1_PASSIV	NSF_Access_to_FTTC_fibre_inStreet	physical access in street site to fibre towards central site
Layer 1.0	L1_PASSIV	NSF_Access_to_FTTx_fibre_inTechnicalBuilding	physical access in central site to fibre towards remote site (customer or curb)
Layer 1.0	E	NSF_Backbone_Duct&Manholes	buried ducts of backbone
Layer 1.0	L1_PASSIV	NSF_Backbone_Fibre_bundle	backbone fibre
Layer 1.0	E	NSF_Copper_Distribution_pairs	twisted copper pair connectivity between street cabinet and customer copper premise
Layer 1.0	L1_PASSIV	NSF_Copper_Feeding_pairs	twisted copper pair connectivity between street cabinet and central site
Layer 1.0	E	NSF_FTTC_bundle(4or8fibres)	fibre bundle connectivity between central office and street level site
Layer 1.0	L1_PASSIV	NSF_FTTC_Duct&Manholes	underground hole between central office and street level site
Layer 1.0	E	NSF_FTTO_bundle	fibre bundle connectivity between central office and customer site or intermediate complex node (in access network)
Layer 1.0	L1_PASSIV	NSF_FTTO_Duct&Manholes	underground hole between central office and customer or intermediate complex node (in access network)
Layer 1.0	L1_PASSIV	NSF_Intercept_Distribution_pairs_inStreet	derivation back and forth of customer twisted pair from street cabinet towards street optical platform
Layer 1.0	E	NSF_Intercept_Feeding_pairs_inTechnical Building	derivation back and forth of customer twisted pair from central site distribution towards central site broadband equipment
Layer 1.0	L1_PASSIV	NSF_Continue_Feeding_pairs_inTechnical Building	extension inside central site of twisted pairs towards other access equipment
Layer 1.1	L1_ACTIVE	NSF_Access_Add_Drop_Lambda	put or retrieve a digital signal from a optical wavelength in the access network
Layer 1.1	L1_ACTIVE	NSF_Core_Add_Drop_lambda	put or retrieve a digital signal from a optical wavelength in the core backbone network
Layer 1.1	L1_ACTIVE	NSF_Core_Optical_Networking	multiplex/demultiplex optical wavelengths, amplify composed optical signal in the core backbone network
Layer 1.1	L1_ACTIVE	NSF_Express_Add_Drop_lambda	put or retrieve a digital signal from a optical wavelength in the backbone express network
Layer 1.1	L1_ACTIVE	NSF_Express_Optical_Networking	multiplex/demultiplex optical wavelengths, amplify composed optical signal in the express backbone network
Layer 1.1	L1_ACTIVE	NSF_Regional_Add_Drop_lambda	put or retrieve a digital signal from a optical wavelength in the backbone regional network
Layer 1.1	L1_ACTIVE	NSF_Regional_Optical_Networking	multiplex/demultiplex optical wavelengths, amplify composed optical signal in the backbone regional network
Layer 2.0	L2_TDM	NSF_PDH_DigitalCrossConnect	sub 2M digital cross connect
Layer 2.0	L2_TDM	NSF_SDH_Core_Ring	SDH backbone core clusters
Layer 2.0	L2_TDM	NSF_SDH_DigitalCrossConnect	
Layer 2.0	L2_TDM	NSF_SDH_Express_Ring	SDH backbone express clusters
Layer 2.0	L2_TDM	NSF_SDH_Grooming	collection of SDH bandwidths from access network and distribution to backbone network
Layer 2.0	L2_TDM	NSF_SDH_Point_to_Point	remainings of old SDH meshed network
Layer 2.0	L2_TDM	NSF_SDH_Broadcast	SDH unidirectional drop& continue for broadcast
Layer 2.0	L2_TDM	NSF_SDH_Regional_Ring	SDH backbone regional clusters
Layer 2.0	L2_TDM	NSF_TDM_Access_Line_HighEnd	PDH/SDH equipment at customer premisses for large delivery/collection of high bandwidth

Layer2.0	L2_TDM L2_PACKET	NSF_TDM_Access_Line_LowEnd	copper based equipment at customer premisses for large delivery/collection of small bandwidth
Layer2.1	BASED L2_PACKET	NSF_ADSL_SDSL_Aggregation	ADSL(2+)/SDSL bitstreams collection and aggregation towards ATM or Ethernet transport networks
Layer2.1	BASED L2_PACKET	NSF_ATM_Regional_Transport	ATM regional backbone switching
Layer2.1	BASED L2_PACKET	NSF_ATM_Tributary_Access	Tributary access to ATM backbone switched network
Layer2.1	BASED L2_PACKET	NSF_Ethernet_Access_Line	Ethernet/optical equipment at customer premisses for delivery/collection of high bandwidth VLANs
Layer2.1	BASED L2_PACKET	NSF_Ethernet_Regional_Unicast	Ethernet network for unicast VLAN transport
Layer2.1	BASED L2_PACKET	NSF_Ethernet_Regional_Multicast	Ethernet network for broadcast
Layer2.1	BASED L2_PACKET	NSF_Ethernet_Express_Switching	Ethernet/MPLS switching in backbone express network
Layer2.1	BASED L2_PACKET	NSF_Ethernet_Express_IO	Access to Ethernet/MPLS switching in backbone express network
Layer2.1	BASED L2_PACKET	NSF_Ethernet_first_mile	Ethernet/copper equipment at customer premisses for delivery/collection of low bandwidth VLANs
Layer2.1	BASED	NSF_VDSL_Aggregation	VDSL bitstreams collection and aggregation towards Ethernet transport networks
Layer3	L3_IP	NSF_BroadBand_Public_IP_Collect	Access authentication , data traffic accounting, attribution of public IP address to broadband customers and collection of customer traffic towards public internet service providers
Layer3	L3_IP	NSF_BroadBand_VoD_IP_Collect	Access authentication , data traffic accounting, attribution of IP TV address to IP TV customers and collection of IP video customer traffic towards Video On Demand platforms
Layer3	L3_IP	NSF_BroadBand_VoIP_IP_Collect	Access authentication , data traffic accounting, attribution of Voice over IP address to VoIP customers and collection of Voice over IP customer traffic towards VoIP platforms
Layer3	L3_IP	NSF_Dedicated_Access_to_PrivateIP	
Layer3	L3_IP	NSF_PrivateIPSwitching	IP-VPN switching
Layer3	L3_IP	NSF_PublicInternetSwitching	Public Internet Routing
Layer3	L3_IP	NSF_IP_security	
Layer4	L4_IDTV	NSF_BroadcastTV	
Layer4	L4_IDTV	NSF_VoD	
Layer4	L4_VOICE	NSF_Advanced_Number_Translation_Call Handling	Voice Value Added network function destined to Business customers
Layer4	L4_VOICE	NSF_CallerIdentity_CallHandling	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_CallingCard_CallHandling	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_InteractiveVoiceResponse_CallHandling	Voice Value Added network function
Layer4	L4_VOICE	NSF_InternetDialUp_CallHandling	
Layer4	L4_VOICE	NSF_ISDN_Primary_Access	Access for PRA
Layer4	L4_VOICE	NSF_ISDN_Voice_concentrator	Aggregation of ISDN voice calls towards backbone circuit switching
Layer4	L4_VOICE	NSF_NumberPortability_CallHandling	telephony ported number realtime translation
Layer4	L4_VOICE	NSF_OtherAdvanced_CallHandling	Voice Value Added network function
Layer4	L4_VOICE	NSF_PrepaidCallingCard_CallHandling	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_PSTN_Voice_concentrator	Aggregation of PSTN voice calls towards backbone circuit switching
Layer4	L4_VOICE	NSF_Televoiting_CallHandling	Voice Value Added network function destined to Business customers
Layer4	L4_VOICE	NSF_VirtualPrivateNetwork_CallHandling	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_Voice_call_CAE_charging	generation of call detail records for interoperator voice traffic accounting

Layer4	L4_VOICE	NSF_Voice_call_CAE_Processing	handling of voice calls at transit level
Layer4	L4_VOICE	NSF_Voice_call_CAE_Trunks	multiplexing/demultiplexing voice circuits at transit level
Layer4	L4_VOICE	NSF_Voice_call_Local_charging	generation of call detail records for customer voice usage charging
Layer4	L4_VOICE	NSF_Voice_call_Local_Processing	handling of voice calls at originating or terminating level
Layer4	L4_VOICE	NSF_Voice_call_Local_Trunks	multiplexing/demultiplexing voice circuits generated/terminated
Layer4	L4_VOICE	NSF_WakeUp_CallHandling	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_MessageWaitingIndicator_Inserting	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_Service_Announcements_Playing	
Layer4	L4_VOICE	NSF_Automated_call_distribution	intelligent distribution of calls towards call center
Layer4	L4_VOICE	NSF_Voicemail&Messaging	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_VoiceFeatures_SelfManaging	Voice Value Added network function destined to residential customers
Layer4	L4_VOICE	NSF_Public_NumberPortability_Database	telephony ported number repository
Layer4	L4_VOICE	NSF_Payphones	
Layer4	L4_VOICE	NSF_ISDN_NetworkTermination	
Layer4	L4_VOICE	NSF_PairGainSystem	

All the investment costs of Belgacom SA assets are mapped to these NSF , except investments related with network administration, and some other that cannot be related to any current product or service. The exceptions are not filed into the network allocation cascade , but are allocated like an overhead cost (i.e. with no direct causality) to a range of End User Services (depending on the kind of overhead cost) proportionally to the cascaded costs on these EUS.

Mapping asset cost sources to Asset objects of the model AC2

There are 147 network assets , they are all 1-to-1 allocated to a homonymic AC2 object except for the 7 voice switching assets which are aggregated in AC2_Voice_Switching_Equipment.

Mapping AC2 objects to cost pools or Network elements

AC2 Aggregation.

At this stage 140 AC2 asset objects are aggregated into 15 cost pools, 38 network elements , 3 overhead objects and eventually 3 end user services (costs for subsidiaries, marginal end user services , or direct waste).

The aggregations into 15 cost pools serve to form technology pools for which operational inventories can be queried for various statistics that are further used to decompose into network elements. The technology pools typically are (D)WDM equipment, ATM equipment, Copper Cables, Broadband (ADSL/SDSL) equipment, SDH equipment , PDH equipment, Ethernet equipment etc.

The aggregation into 38 network elements concerns assets that are already a network element , and it serves also to gather assets that are individually more detailed than the definition of network elements and that can be easily associated to a network element . Typical examples are IP-VPN assets , broadcast TV assets, Analog Multiplexers, Metallic line testing assets etc.

AC2 Deaggregation.

By contrast, a set of 13 AC2 assets are decomposed (deaggregated) into 18 cost pools, 21 Network elements and 1 waste pool.

Among these, 8 assets collect investments on network administration (Hardware and software supervision platforms) and on value added services platforms (IN, messaging, voice mail etc.) ; they need to be decomposed into the network technologies they supervise and into the value added service categories.

⇒ The driver used is the “cumulated historical investment” per technology obtained after deep analysis of historical investment data (TM1 financial reporting tool).

One asset collects internal cabling within technical buildings and is decomposed essentially into the following cost pools CP_Backbone_Coax_cabling, CP_Backbone_Optical_cabling, NE_CopperPairs_cabling.

⇒ The driver used is the “estimated annualized cost” of the cost pools , calculated from a diversity of constituent volumes and corresponding prices (coax/fibre cables, connectors, copper pair cables , cable ways,etc) . The main volumes are extracted from the infrastructure inventory database (ITR), other volumes are derived under assumptions.

The AC2_VoiceSwitching_Equipment asset is decomposed in the three main switching units forming the switched network topology : the Remote Units (acting principally as voice concentrators), the Base units (providing call processing and local switching), and the Transit Units (providing transit switching).

⇒ The driver used is the “Nbr of equivalent lines” , a unit that is at the basis of the purchase contracts with the switches vendors where purchased switching Unit (Remote, Base, Transit) value is proportional to the equivalent lines installed per switching unit. The driver value is obtained from installed base reporting of the switched voice network.

Deaggregation of cost pools into network elements

In performing the previous steps 25 cost pools are introduced in the model. They are now deaggregated into 58 different Network Elements by means of following drivers:

ELEMENT	Driver Name	Deaggregated Network elements
CP_(D)WDM_equipment	EstimatedValue_of_DWDM_Component	electrical-optical_transponders, WDM customer premise equipment, optical multiplexer
CP_ATM_Equipment	Underlying AC Cost Composition	ATM backbone switching&backbone trunk, ATM access interfaces
CP_Backbone_Coax_cabling	Nbr_Connections	pre-allocated to all inside network elements using coax cabling
CP_Backbone_Optical_cabling	Nbr_Connections	pre-allocated to all inside network elements using fibre cabling
CP_Copper_Burried_Cables&Splices	CalculatedCurrentValue_of_UnderlyingCopperAsset	distribution cables , feeding cables
CP_DSLAM	EstimatedValue_of_DSLAM_Components	splitters, broadband aggregators, ATM/Ethernet aggregators
CP_Ducts&Manholes	ActualizedInvestedValue_of_Ducts	Ducts&Manholes for Next Generation Access, Ducts&Manholes for corporate/complex nodes in access
CP_EthernetMPLS_equipment	EstimatedValue_of_EthernetMPLS_Component	Ethernet Ports, Ethernet/MPLS switches
CP_ETHLTE_Copper	Nbr_Equipment	

CP_IntelligentNetwork_Hardware	EstimatedValue_of_IN_HW_components	Service Control Point hardware, Service ManagementPoint Hardware, CPU, RAM memory , Disk
CP_IPVPN_equipment	direct	
CP_LTE140M_Optical	Total_installed_bandwidth_capacity(Gbps)	
CP_LTE34M_Optical	Total_installed_bandwidth_capacity(Gbps)	
CP_Main_Distribution_Frame	direct	
CP_Optical_Fibre_Cables	ActualizedInvestedValue_of_FibreCables	Fibre cables for Next Generation Access, Fibre Cables for corporate/complex nodes in access
CP_Optical_Frame	Nbr_fibres_installed	Access optical frame, backbone optical frame
CP_OSS_PDH	fair split	
CP_OSS_VoiceTraffic	fair split	
CP_Remote_Optical_platform	EstimatedValue_of_ROP_Components	Housing&powering, copper cabling, fibre cabling
CP_SDH	EstimatedValue_of_SDH_Components	Add/Drop Multiplexers at customer sites, Add/Drop Multiplexers in backbone, Special configurations in digital cross-connects
CP_VDSL1	direct	
CP_VDSL2	EstimatedValue_of_VDSL2_components	Host aggregators, VDSL2 central site aggregators
CP_VoiceDigital_BaseUnit	%VendorCertifiedValue_of_RemoteUnit_subcomponents	Voice concentration elements, Originating/Terminating Voice call handling elements
CP_VoiceDigital_RemoteUnit	%VendorCertifiedValue_of_RemoteUnit_subcomponents	Voice concentration elements, Voice call handling elements
CP_VoiceDigital_TransitUnit	%VendorCertifiedValue_of_RemoteUnit_subcomponents	Voice concentration elements, Transit Voice call handling elements

From Network elements to Network Stage Functions

The previous steps populate the cost model with 86 Network Elements. In the next step , they are allocated to the 84 Network Stage Functions.

Among these, 60 network elements are directly embedded within Network Stage Function (either identical to a NSF or constituent of a NSF).

Network Elements per technology		Network Stage Function	
Technology	Nbr NE in model	Technology	Nbr NSF
(D)WDM	2	(D)WDM	2
ALL	1	ALL	1
ATM	2	ATM	2
ATMÐERNET	1	UNSPECIFIED	1
BROADBAND	6	BROADBAND	2
COPPERPLANT	3	COPPERPLANT	2
ETHERNET	3	ETHERNET	2
FIBREPLANT	1	COPPERPLANT	1
	5	FIBREPLANT	5
IDTV	2	IDTV	2
INTERNALPLANT	1	COPPERPLANT	1
IP	3	IP	3
MWE	2	SDH&PDH	1
NGN	2	ETHERNET	2
PDH	1	PDH	1
	9	SDH&PDH	2
SDH	3	SDH	2

	2	SDH&PDH	1
TMN	1	(blank)	1
VOICE	1	BVAS	1
	4	MVAS	4
	4	VOICE	4
X25	1	(blank)	1
Grand Total	60		44

The other 26 network elements need to be further decomposed either because they still aggregate a same function deployed in different network stages or because they still aggregate different functions delivering different volumes.

Network Elements per technology		Network Stage Function	
Technology	Nbr NE in model	NSF_technology	Nbr of NSF
(D)WDM	2	(D)WDM	6
BROADBAND	1	BROADBAND	2
COPPERPLANT	2	COPPERPLANT	5
FIBREPLANT	1	COPPERPLANT	1
	2	FIBREPLANT	6
INTERNALPLANT	1	COPPERPLANT	2
IP	1	IP	3
NGN	3	ETHERNET	6
SDH	1	SDH	5
VOICE	1	BVAS	3
	0	MVAS	7
	4	VOICE	11
	0	VAS	1
VAS	6	BVAS	18
	0	MVAS	42
	0	VAS	6
VOIP	1	VOICE	2
Grand Total	26		126

The decomposition of network elements into network stage function is driven by a variety of cost drivers listed below per technology :

NE_technology	DriverName	DriverName
(D)WDM	cumulated_multiplex_capacity_amount (#lambdas)	Number of wavelengths capacity x Number of equipment to distribute the cost into regional clusters, core clusters, express clusters
	Used_AddDrop_capacity_amount(#lambdas)	Number of wavelengths added or dropped x Number of equipment to distribute the

		costs to regional , core and express clusters
BROADBAND	Nbr_Of_Installed_lines_ADSL2+_VDSL1	
	Nbr_of_pair_position_occupied	
COPPERPLANT	Nbr_TerminatedPairs	
FIBREPLANT	%EstimatedValue_of_DuctMaterial&Trenching FairSplit Nbr_kmxFibres	Estimation of cost portion attributable to access duct, backbone ducts and spare ducts
INTERNALPLANT	Nbr_of_pair_position_occupied	
IP	Total_tributary_capacity(Gbps)	
NGN	Broadcast_nonBroadcast_capacity(Gbps) Broadcast_nonBroadcast_Trunk_capacity(Gbps)	
SDH	EstimatedValue_of_SDH_Clusters	
VAS	perc_occupation_of_IN_hardware_by_services	
VOICE	Invested_Amount Nbr_of_equivalenceInstalledLines RoutedMin VendorCertifiedValue_of_Originating_Terminating_CallHandling_subcomponents VendorCertifiedValue_of_Transit_CallHandling_subcomponents	
VOIP	VoIP_call_handling_distribution_local_Area	

7.3 End User Services

The network allocation model terminates when all network stage functions have been allocated to network layer services and when network layer services have been combined into a user level telecommunication service , the End User Service.

The End User must be understood as the telecommunication service party that will pay for the service. In case of a retail service the user is identical to the service consumer (residential service) or to the service provider (business service) , in case of wholesale service , the user is in principle another licensed operator , or a network service provider.

Being composed of network layer services, End User Services may emanate from different levels of network layers since interconnection between network operators is being unbundled . For retail services , the end user telecommunication services may arise from different layers : the more a service is oriented for a specific usage the higher the level of network layers involved. For example IP services are less usage oriented than voice telephony, the latter being a layer 4 service, the former a layer 3 service.

7.4 Network services of the passive infrastructure layer : NLS1.0

7.4.1 Definition

This layer deals with the physical end-to-end connectivity between customers and the Belgacom Office (access), the physical connectivity inside the Belgacom Office between access equipment and the physical connectivity between Belgacom offices (backbone).

Access Physical connectivity services (see Figure 12):

- NLS1_o_Continue_Raw_Copper : internal cabling copper connectivity from Main Distribution Frame to other access active equipment like voice switches, leased lines access equipment, collocated access equipment (of other licensed operators).
- NLS1_o_Continue_Shared_Copper : internal cabling copper connectivity from broadband splitter equipment and collocated access equipment (of other licensed operators)
- NLS1_o_Copper_Localloop_testing : inside copper connectivity and equipment required to perform remote testing of the copper loop.
- NLS1_o_Copper_Splitter : resources to split narrowband and broadband copper physical signal .
- NLS1_o_Copper_Subloop : end to end copper connectivity (copper pair) from the network termination point at the customer premises and a delivery point in the street (street cabinet).
- NLS1_o_Copper_Subloop_testing : outside and inside copper connectivity and equipment required to perform remote testing of the copper subloop.
- NLS1_o_Fibre_connect_to_the_cabinet : end to end fibre optical connectivity between the central sites and the street cabinets.
- NLS1_o_Intercept_Raw_Copper : internal cabling copper connectivity between the Main distribution Frame and Belgacom's Central site broadband access equipment.
- NLS1_o_Intercept_Subloop_Copper : curb level copper connectivity between the street cabinet and Belgacom's street sited broadband access equipment.
- NLS1_o_PowerToTheCurb : outside and inside copper connectivity to transport electrical energy from Belgacom's central sites and Belgacom's street sites.
- NLS1_o_Raw_Copper : end to end copper connectivity (copper pair) from the network termination point at the customer premises and the Central site.
- NLS1_o_Fibre_connect_to_the_office : end to end fibre optical connectivity between the central sites and corporate customers office buildings and Belgacom subtended optical nodes.

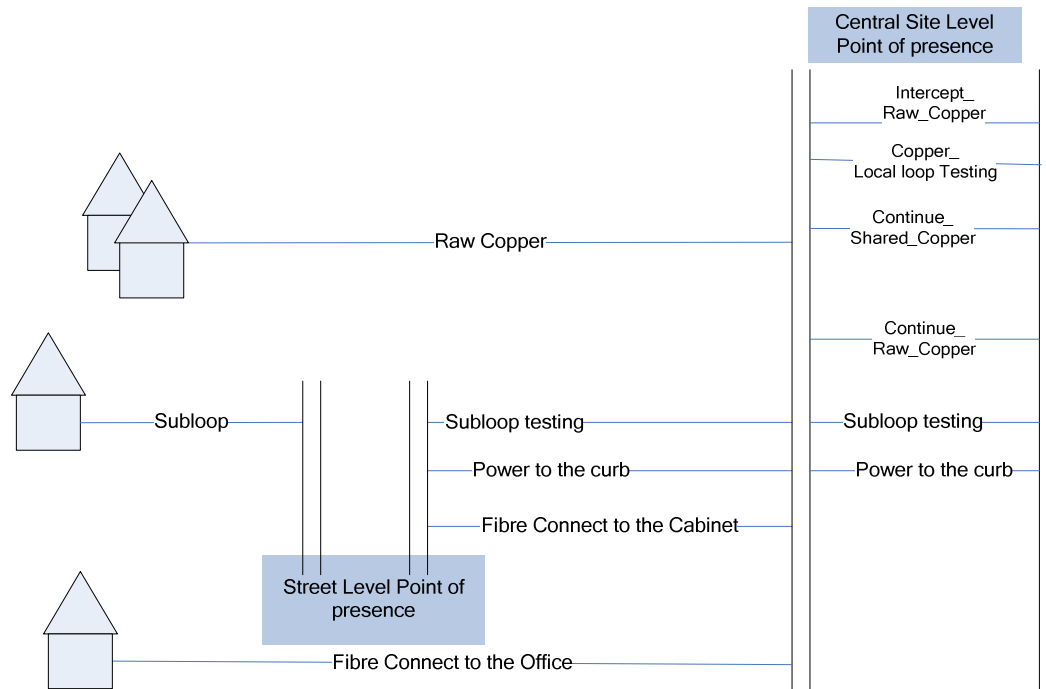


Figure 12

Backbone Physical connectivity services:

- NLS1_o_Fibre_connect_Backbone_Ethernet_Express_clusters : end to end fibre connection between MPLS equipment of the express MPLS cluster
- NLS1_o_Fibre_connect_Backbone_Ethernet_Regional_clusters : end to end fibre connection between MPLS equipment of the regional MPLS clusters forming the Ethernet aggregation network
- NLS1_o_Fibre_connect_Backbone_Point2Point : end to end fibre connection between (D)WDM clusters and also between residual SDH point to point capacities
- NLS1_o_Fibre_connect_Backbone_SDH_Core_rings : end to end fibre connection between SDH equipment of the core normal SDH clusters
- NLS1_o_Fibre_connect_Backbone_SDH_Express_rings : end to end fibre connection between SDH equipment of the core express SDH clusters
- NLS1_o_Fibre_connect_Backbone_SDH_Regional_rings : end to end fibre connection between SDH equipment of the regional SDH clusters

7.4.2 Usage of the passive infrastructure

The physical connectivity services of this layer are used by upper layers in order to interconnect their specific equipment (modelled in the Network Stage Function of that layer). The costs are distributed to the service users according to “consumption drivers” as listed in the next table.

Network layer Service	Driver	Service consumers
<u>NLS1_0_Continue_Raw_Copper</u>	Nbr_of_used_pairs	BRUO raw copper, Local tails for leased linestype of connectivity, ISDN/PSTN accesses
<u>NLS1_0_Continue_Shared_Copper</u>	Direct	BRUO Shared pairs
<u>NLS1_0_Copper_Localloop_testing</u>	nbr of broadband lex based without voice	Broadband bitstream layer 2.1 services
<u>NLS1_0_Copper_Splitter</u>	Direct	BRUO Shared pairs
<u>NLS1_0_Copper_Subloop</u>	Direct	VDSL bistream layer 2.1 service
<u>NLS1_0_Copper_Subloop_testing</u>	Direct	VDSL bistream layer 2.1 service
<u>NLS1_0_Fibre_connect_Backbone_Ethernet_Express_clusters</u>	Direct	Intercity Pseudowire layer2.1 service
<u>NLS1_0_Fibre_connect_Backbone_Ethernet_Regional_clusters</u>	Broadcast_nonBroadcast_Trunk_capacity(Gbps)	Layer 2.1 Unicast VLAN s and Broadcast VPLS.
<u>NLS1_0_Fibre_connect_Backbone_Point2Point</u>	km equivalent fibre pairs consumed	DWDM layer 1.1 networksand Trasnport segments of leased lines/backhaul, Broadcast ,
<u>NLS1_0_Fibre_connect_Backbone_SDH_Core_rings</u>	km*Mbit/s	Trasnport segments of leased lines/backhaul, Broadcast ,
<u>NLS1_0_Fibre_connect_Backbone_SDH_Express_rings</u>	km*Mbit/s	Trasnport segments of leased lines/backhaul, Broadcast ,
<u>NLS1_0_Fibre_connect_Backbone_SDH_Regional_rings</u>	km*Mbit/s	Trasnport segments of leased lines/backhaul, Broadcast ,
<u>NLS1_0_Fibre_connect_to_the_cabinet</u>	Direct	VDSL bistream layer 2.1 service
<u>NLS1_0_Fibre_connect_to_the_office</u>	Nbr_fibreBundles_Used	Local tails services of layer 2.0 (for leased lines), of layer 2.1 (Ethernet local tails), and of layer 1.1 (optical leased lines) and backbone services delivered by equipment located in subtended optical nodes
<u>NLS1_0_Intercept_Raw_Copper</u>	Nbr_of_used_pairs_LEXbased_ADSL_VDSL_SharedPair	BRUO shared pair and broadband bistream layer2.1 services
<u>NLS1_0_Intercept_Subloop_Copper</u>	Direct	VDSL bistream layer 2.1 service
<u>NLS1_0_PowerToTheCurb</u>	Direct	VDSL bistream layer 2.1 service
<u>NLS1_0_Raw_Copper</u>	Nbr_of_used_pairs	BRUO raw copper, Local tails for leased linestype of connectivity, ISDN/PSTN accesses

7.4.3 Contributors to the passive infrastructure layer

7.4.3.1 Access

The objective of the access network is the delivery of a connection between our customers and our telecommunication network where all services are implemented.

7.4.3.1.1 From customer premises to central site

The related access network services of the passive infrastructure layer are based on the following NSF :

- *NSF_Access_to_distribution_pairs_inStreet*
- *NSF_Copper_Distribution_pairs*

are attributed to the copper subloop for VDSL without voice connections and to the raw copper for all other copper connections.

- *NSF_Access_to_feeding_pairs_inStreet*
- *NSF_Copper_feeding_pairs*

are attributed to the copper subloop testing for VDSL without voice connections, to power to the curb based on the number of copper pairs used for remote powering of Belgacom's street sites and to the raw copper for all other copper connections.

- *NSF_Access_toFTTC_fibre_in Street*
- *NSF_FTTC_bundle(4or8fibres)*
- *NSF_FTTC_Duct&Manholes*

are attributed to fibre connect to the cabinet (street site Remote optical platform ROP)

- *NSF_FTTO_bundle*
- *NSF_FTTO_Ducts&Manholes*

are attributed to fibre connect to the office (corporate customers building).

- *NSF_Intercept_Distribution_pairs_inStreet*

is attributed to intercept subloop copper.

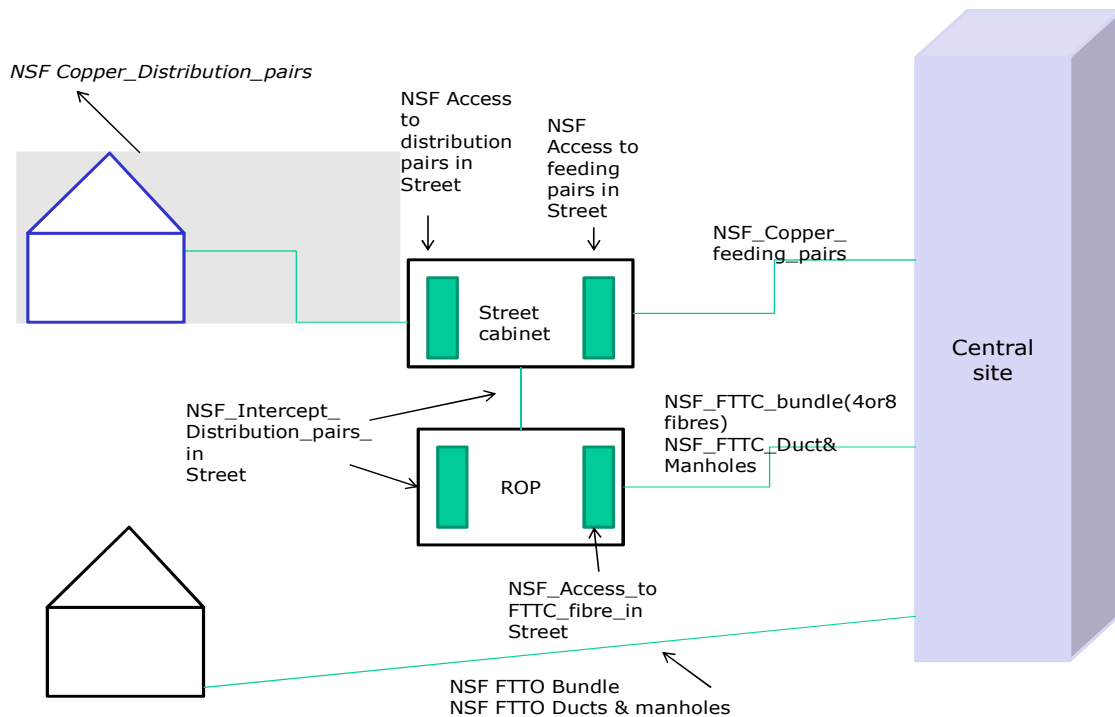


Figure 13

7.4.3.1.2 Inside central site

The related access network services of the passive infrastructure layer are based on the following NSF :

NSF_Access_to_copper_pairs_inTechnicalBuilding

is attributed to the copper subloop testing for VDSL without voice connections, to power to the curb based on the number of copper pairs used for remote powering of Belgacom's street sites and to the raw copper for all other copper connections.

NSF_Access_to_FTTx_fibre_inTechnicalBuilding

is attributed to fibre connect to the cabinet and to fibre connect to the office based on the number of fibres used.

NSF_Continue_feeding_pairs_in Technical building

is attributed to :

- continue shared copper based on the number of shared pairs in service,
- copper local loop testing for broadband without voice customers connections at the central site,
- copper subloop testing for VDSL without voice customer connections at the street cabinet,
- power to the curb based on the number of copper pairs used for remote powering of Belgacom's street sites
- continue raw copper for all other copper pairs in use.

NSF_Intercepts_Feeding_Pairs_inTechnical building

Is attributed to intercept raw copper, and is used for ADSL customer connections, VDSL2 customer connections central site based and shared pairs.

NSF_PSTN_Voice_concentrator

is attributed to :

- copper local loop testing based on the number of broadband without voice customers connections at the central site,
- copper subloop testing for VDSL without voice customer connections at the street cabinet,
- PSTN Access based on the number of subscriptions

Customer connections without voice are connected to the switching equipment in order to perform remote testing of the line.

NSF_Split_Copper signal

Is attributed to copper splitter which enables to split narrowband and broadband copper physical signal for shared pairs.

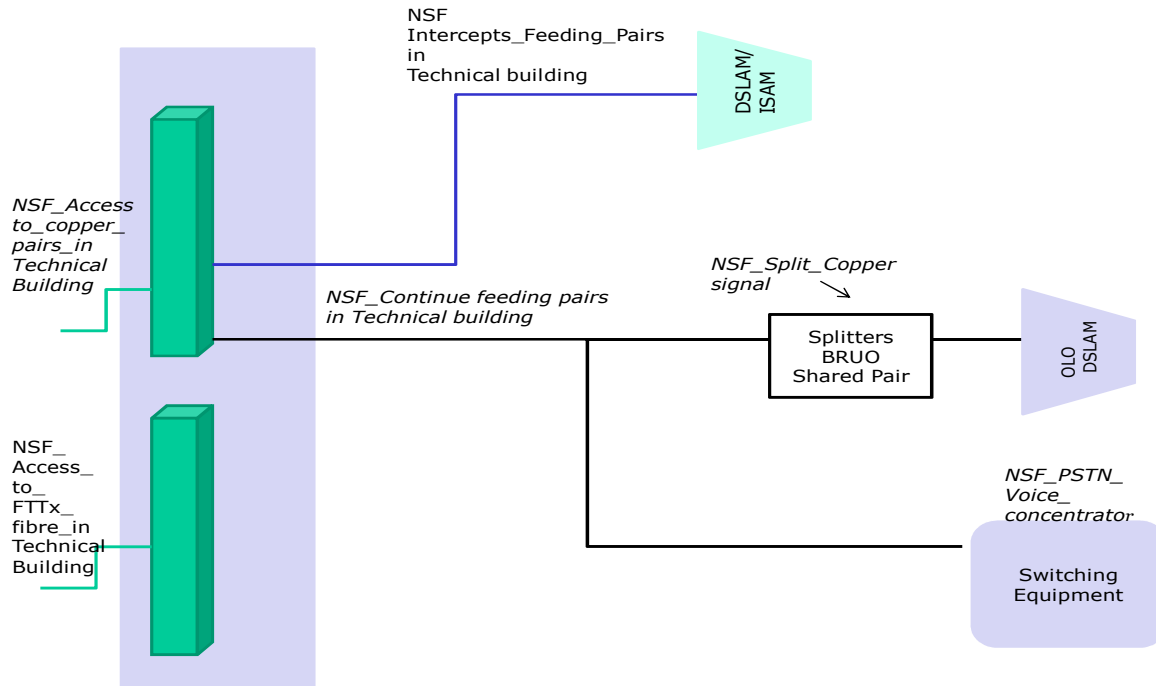


Figure 14

7.4.3.2 Backbone

All fibre connectivity services are realized by 9 different Network Stage Functions , essentially resources in the fibre outside plant (ducts&manholes, fibre cables), and optical frame structures allowing to terminate the fibre connectivity within a point of presence (central office or street cabinet level).

The following 5 resources are not shared but directly associated with a connectivity service.

Network resource	ELEMENT2
NSF_Access_to_FTTC_fibre_inStreet	NLS1_0_Fibre_connect_to_the_cabinet
NSF_FTTC_bundle(4or8fibres)	NLS1_0_Fibre_connect_to_the_cabinet
NSF_FTTC_Duct&Manholes	NLS1_0_Fibre_connect_to_the_cabinet
NSF_FTTO_bundle	NLS1_0_Fibre_connect_to_the_office
NSF_FTTO_Duct&Manholes	NLS1_0_Fibre_connect_to_the_office

The remaining 4 resources are shared and a specific driver allows to distribute each resource to the fibre connectivity services:

Network resource	Sharing Driver	Connectivity service
NSF_Access_to_FTTx_fibre_inTechnical Building	Nbr_used_fibres_to_Access (LDC incl.)	NLS1_0_Fibre_connect_to_the_cabinet

NSF_Backbone_Duct&Manholes	Nbr_km_used_Backbone_tracks	NLS1_0_Fibre_connect_to_the_office
		NLS1_0_Fibre_connect_Backbone_Ethernet_Express_clusters
		NLS1_0_Fibre_connect_Backbone_Ethernet_Regional_clusters
		NLS1_0_Fibre_connect_Backbone_Point2Point
		NLS1_0_Fibre_connect_Backbone_SDH_Core_rings
		NLS1_0_Fibre_connect_Backbone_SDH_Express_rings
NSF_Backbone_Fibre_bundle	Nbr_km_used_Backbone_fibre	NLS1_0_Fibre_connect_Backbone_SDH_Regional_rings
		NLS1_0_Fibre_connect_Backbone_Ethernet_Express_clusters
		NLS1_0_Fibre_connect_Backbone_Ethernet_Regional_clusters
		NLS1_0_Fibre_connect_Backbone_Point2Point
		NLS1_0_Fibre_connect_Backbone_SDH_Core_rings
		NLS1_0_Fibre_connect_Backbone_SDH_Express_rings
		NLS1_0_Fibre_connect_Backbone_SDH_Regional_rings
		NLS1_0_Fibre_connect_Backbone_Regional_rings

7.5 Network services of the optical layer (NLS1.1-Services)

7.5.1 Definition

This layer treats the end-to-end optical connectivity service between customers and the Belgacom Office (access), and the optical connectivity between Belgacom Offices (backbone).

An end-to-end optical connectivity is an optical wavelength (called “lambda” or a “colour”) established between two distant end points on which any monofibre optical signal can be placed by means of an optical wavelength converter (transponder). (D)WDM optical equipments are deployed and configured to realize such connections and those transponders; they implement the network stage functions of this layer.

Access

In the access part, the wavelength connectivity service between a customer site and a central office is modeled as NLS1_1_LocalTail_transparent_Very_highCap(WDM)(incl_BLES), it is distance insensitive since local tails may not discriminate on distance between customer and central site.

Backbone

For the connectivity between Belgacom Offices (backbone), different distance stages are distinguished:

Network Layer Service	Description
NLS1_1_Backbone_transparent_Very_highCap_Regional	coloured wavelength connectivity between

I(DWDM)	"local transmission centers" (regional network)
NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)	coloured wavelength connectivity between "zonal transmission centers" (core network)
NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)	coloured wavelength connectivity in the regional network stage (between "large city transmission centers")
NLS1_1_Add_Drop_lambda_Regional	wavelength colouring in local transmission centers
NLS1_1_Add_Drop_lambda_Core	wavelength colouring in zonal transmission centers
NLS1_1_Add_Drop_lambda_Express	wavelength colouring in large city transmission centers

7.5.2 Usage of the optical infrastructure

The wavelength connectivity services of this layer are used by upper layers in order to interconnect their optical equipment (SDH equipment of the layer 2.0, Ethernet/MPLS equipment of layer 2.1).

For the “colouring/decolouring of wavelength” (add_drop_lambda), the direct consumers are the SDH clusters, the Ethernet/MPLS clusters, the optical leased lines both type of clusters being respectively the NSF of layer 2.0 and 2.1. The cost distribution driver is the nbr of add_drops required by these clusters and optical lines. In the model though, the costs are distributed to the services of the upper layers and not to the network stage function of these layers. That’s why the Nbr of add_drops used by the clusters are redistributed to the services implemented by these clusters according to their bandwidth yielding a Nbr of Equivalent Lambdas per service.

Similarly, for the end-to-end wavelength between distant end points, the driver is “Nbr km x lambda” counting the real distances between the wavelength end points. The driver is thus distance sensitive to capture the fact that larger clusters need more wavelength connectivity. The driver “Nbr km x lambda” accounts for the real distances between the wavelength end points occupied by SDH clusters, Ethernet/MPLS clusters, optical leased lines. Here also costs are not distributed to the clusters but to the services realised on these clusters.

That’s why the “Nbr km x lambda” used by the clusters are redistributed to the services implemented by these clusters according to their bandwidth yielding a Nbr_of_kmxLambda_equivalent_consumed.

Network Layer service	Driver Name	Service consumers
NLS1_1_Add_Drop_lambda_Core	Nbr_of_equivalent_lambda_add_drops	Nbr of wavelengths occupied by SDH core clusters used by Transport segments of leased lines/backhaul or Broadcast. Ethernet/MPLS aggregation clusters, optical leased lines
NLS1_1_Add_Drop_lambda_Express	Nbr_of_equivalent_lambda_add_drops	Nbr of wavelengths occupied by SDH express clusters used by Transport segments of leased lines/backhaul or Broadcast. Ethernet/MPLS express clusters, optical leased lines
NLS1_1_Add_Drop_lambda_Regional	Nbr_of_equivalent_lambda_add_drops	Nbr of wavelengths occupied by SDH regional clusters used by Transport segments of leased lines/backhaul or Broadcast. Ethernet/MPLS aggregation clusters, optical leased lines
NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	Nbr of kmx wavelengths occupied by SDH core clusters used by Transport segments of leased

NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	lines/backhaul or Broadcast. Ethernet/MPLS aggregation clusters , optical leased lines Nbr of km x wavelengths occupied by SDH express clusters used by Transport segments of leased lines/backhaul or Broadcast. Ethernet/MPLS aggregation clusters , optical leased lines Nbr of km x wavelengths occupied by SDH regional clusters used by Transport segments of leased lines/backhaul or Broadcast. Ethernet/MPLS aggregation clusters , optical leased lines
NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	Ethernet/MPLS aggregation clusters , optical leased lines
NLS1_1_LocalTail_transparent_Very_highCap(WDM)(incl_BLES)	Nbr_of_lambdas_usedby_customerEquipment	

7.5.3 Contributors to the optical infrastructure.

All end-to-end wavelength connectivity and wavelength colouring services are realized by 7 different Network Stage Functions directly implemented in (D)WDM pieces of equipment

The (D)WDM equipments are deployed in clusters presented in the following picture and form the optical networks. The (D)WDM equipments are interconnected by backbone fibre which is actually a layer 1.0 service. Only the NLS1.0_Fibre_connect_point2Point contributes here , the other Fibre connect services being dedicated to specific clusters not to (D)WDM .

The (D)WDM Network stage functions are directly mapped on the NLS1.1 services as follows :

Network Stage function	Network service
NSF_Access_Add_Drop_Lambda	NLS1_1_LocalTail_transparent_Very_highCap(WDM)(incl_BLES)
NSF_Core_Add_Drop_lambda	NLS1_1_Add_Drop_lambda_Core
NSF_Core_Optical_Networking	NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)
NSF_Express_Add_Drop_lambda	NLS1_1_Add_Drop_lambda_Express
NSF_Express_Optical_Networking	NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)
NSF_Regional_Add_Drop_lambda	NLS1_1_Add_Drop_lambda_Regional
NSF_Regional_Optical_Networking	NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)

The fibre interconnection service is distributed to each (D)WDM cluster based on the cumulated length of fibre pairs consumed.

7.6 Network services of the transmission infrastructure

7.6.1 Definition

This layer deals with the transmission services between customer sites and the Belgacom Offices (access) also called local tail for leased lines, and it deals also with the transport segments services (also called backbone leased lines segments and backhaul capacity) between Belgacom Offices (backbone).

The national wide transmission infrastructure collects transmission traffic in three aggregation stages, local level aggregation (circ 600 locations), zonal level aggregation (circ 36 locations), area level aggregation (20 locations) (see Figure 15 - Transport Segments). Traffic at each stage can be crossconnected allowing to create transport segments from any location to any location.

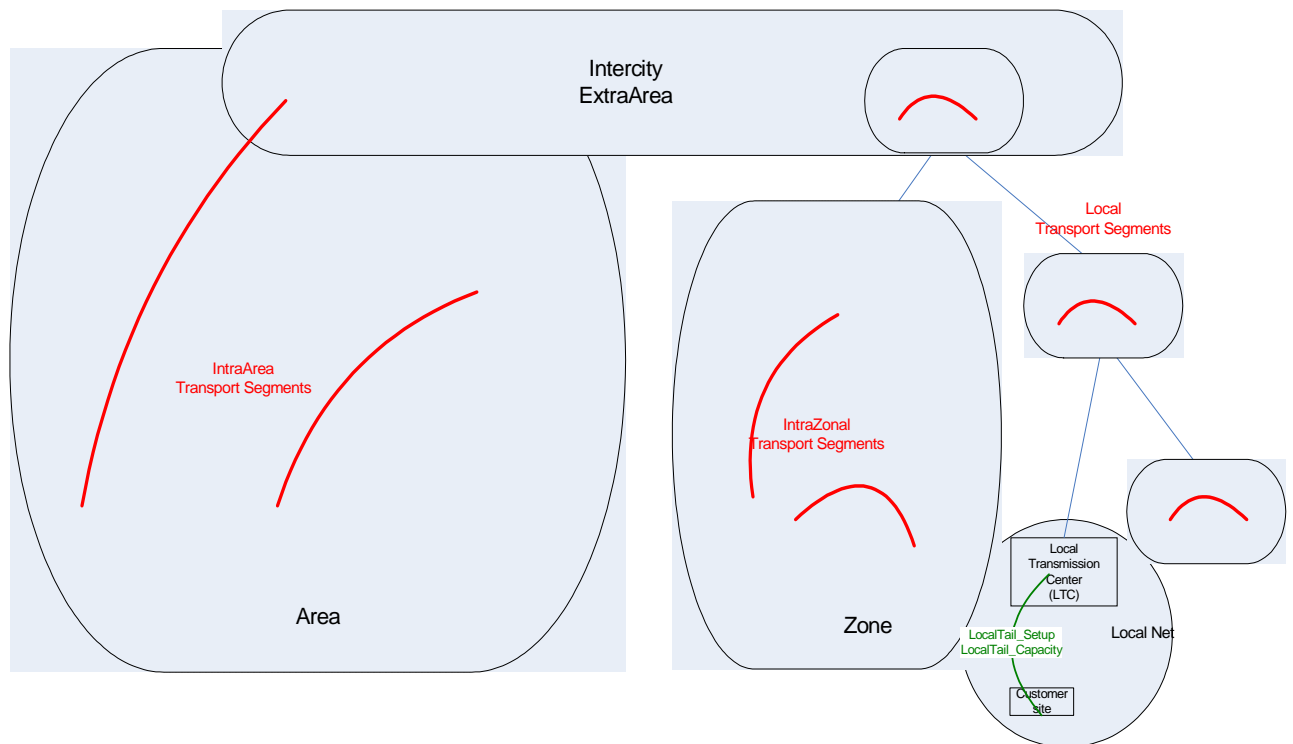


Figure 15 - Transport Segments

Access services

The transmission between the customer site and the Belgacom Office (access) is handled by two service types:

set-up of a link :

NLS2_0_LocalTail<2M_Setup

NLS2_0_LocalTail=2M_Setup

NLS2_0_LocalTail>2M_Setup

They capture costs that are principally related to the physical dedicated link between the customer site and the central office and also to the fixed cost of equipment needed to activate the link in a capacity category. These cost elements are independent of any additional capacity.

Capacity of a link : NLS2_0_LocalTailCapacity captures the costs for capacity on top of a link.

Backbone services:

The backbone transport segments are classified in capacity (or bandwidth) categories: <2Mb/s, 2Mb/s, >2Mb/s combined with distance categories : intraarea > intrazonal > local depending on the end point situation in the aggregation hierarchy.

The following NLS2.0 services are present in the model:

Network Layer 2.0 service
NLS2_0_LocalBackboneCapacity<2M
NLS2_0_LocalBackboneCapacity=2M
NLS2_0_LocalBackboneCapacity>2M
NLS2_0_IntrazonalBackboneCapacity<2M
NLS2_0_IntrazonalBackboneCapacity=2M
NLS2_0_IntrazonalBackboneCapacity>2M
NLS2_0_IntraAreaBackboneCapacity<2M
NLS2_0_IntraAreaBackboneCapacity=2M
NLS2_0_IntraAreaBackboneCapacity>2M
NLS2_0_InterCityBackboneCapacity<2M
NLS2_0_InterCityBackboneCapacity=2M
NLS2_0_InterCityBackboneCapacity>2M
NLS2_0_InterNationalBackboneCapacity>2M
NLS2_0_InterNationalBackboneCapacity<2M
NLS2_0_InterNationalBackboneCapacity=2M
NLS2_0_BroadCast_Capacity

7.6.2 Usage of the transmission infrastructure

Local tail NLS2.0 services are used to bring transmission capacity to the customer sites and they are thus directly involved in leased line services between two customer sites or leased lines to data services, backhaul services to other licensed operators and monitoring of the access network.

Every leased line consumes one of the set-up services depending on the capacity category it belongs to. The costs of the set-up services are distributed according to the “Nbr_of_sites” (customer sites) per category .

Leased lines also consume the LocalTailCapacity service ; the cost of capacity is allocated to the leased lines according to their bandwidth.

	Upper layer Consumer or end user service
Wholesale transport capacity	EUS_Bandwidth_Wholesale EUS_BES subscription
Regulated wholesale segments	EUS_BROTSOLL_EAA_segment EUS_BROTSOLL_segment<2M EUS_BROTSOLL_segment>2M EUS_BROTSOLL_segment2M
Retail&Wholesale leased lines	EUS_LL <2M International EUS_LL <2M National EUS_LL >2M International EUS_LL 2M International EUS_LL 2M National EUS_LL Analog International subscription EUS_LL_Analog National EUS_X25
Access leased lines to data services (IP-VPN)	NLS3_Private_IP&Ethernet_Extensi on_on_symmetric_HighEnd NLS3_Private_IP&Ethernet_Extensi on_on_symmetric_LowEnd
Monitoring lines	OVH_Management_Network

7.6.3 Contributors to the transmission infrastructure

7.6.3.1 Local Tail

A local tail transmission service is made of equipment installed at the customer premises extracting the digital signal from the physical line, of a physical link between the customer site and the central office and of grooming equipment in the central office (or subtended optical nodes). Depending on the bandwidth of the local tail different equipment technologies are installed: PDH on copper, PDH on fibre or SDH on fibre.

For high bandwidth (>2Mb/s), a fibre based technology is required, for lower bandwidth fibre or copper technology can do. Fibre local links being much more expensive than copper links, low bandwidth local tails will use principally copper based solutions while large bandwidth will use fibre. In addition, equipment used for low rate is not designed to be modular in sub 2M rates, therefore the cost of equipment deployed will depend more on nbr of sites than on bandwidth. By contrast, for large bandwidth optical equipment (SDH and PDH) is modular and can easily be upgraded to higher capacities. The cost of optical equipment is split in a fixed part independent of bandwidth increments and a bandwidth dependent part.

The fixed part of local tails is captured by the NLS2.0_LocalTailxxx_setup service where the capacity category (<2M, =2M, >2M) allows to segregate the underlying physical technology.

Practically the cost of the fixed part emanates directly from the costs of low end equipment collected in layer 2.0 Network Stage function NSF_TDM_Access_Line_LowEnd ,

and from a portion of the costs (estimating the fixed part) of high end equipment collected in layer 2.0 NSF_TDM_Access_Line_HighEnd.

Finally , the costs of physical links (layer 1.0 services) are added:

Layer2.0 NSF and lower layer services as cost contributors	Driver Name	Layer2.0 service
NLS1_0_Continue_Raw_Copper	Nbr_of_used_pairs	NLS2_0_LocalTail<2M_Setup NLS2_0_LocalTail=2M_Setup
NLS1_0_Fibre_connect_to_the_office	Nbr_fibreBundle_Used	NLS2_0_LocalTail<2M_Setup NLS2_0_LocalTail=2M_Setup NLS2_0_LocalTail>2M_Setup
NLS1_0_Raw_Copper	Nbr_of_used_pairs	NLS2_0_LocalTail<2M_Setup NLS2_0_LocalTail=2M_Setup
NSF_TDM_Access_Line_HighEnd	Nbr_equivalent_equipment_used	NLS2_0_LocalTail<2M_Setup NLS2_0_LocalTail=2M_Setup NLS2_0_LocalTail>2M_Setup
NSF_TDM_Access_Line_LowEnd	Nbr_of_lines	NLS2_0_LocalTail<2M_Setup NLS2_0_LocalTail=2M_Setup

The variable, bandwidth dependent part costs emanate from the remaining portion of high end optical equipment cost and from the central office grooming equipment costs which are both Network Stage Functions of layer2.0:

Layer2.0 NSF contributor to NSL2.0 localtailcapacity service	Driver Name	ELEMENT
NSF_PDH_DigitalCrossConnect	CrossConnected_TimeSlots	NLS2_0_LocalTailCapacity
NSF_SDH_DigitalCrossConnect	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	NLS2_0_LocalTailCapacity
NSF_SDH_Grooming	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	NLS2_0_LocalTailCapacity
NSF_SDH_Point_to_Point	Transported_TimeSlots	NLS2_0_LocalTailCapacity
NSF_TDM_Access_Line_HighEnd	Nbr_equivalent_equipment_used	NLS2_0_LocalTailCapacity

7.6.3.2 Transport Segments

Transport segments are realised by configuring the SDH clusters in different network stages. The transmission aggregation levels introduced hereabove (section 7.6.1) are realised by different SDH

clusters (regional SDH rings, core SDH rings, and express SDH rings) interconnected by digital-crossconnects. SDH rings are made of add-drop multiplexers deployed in LTC for the regional ones, in ZTC for the core ones and in the XTC for the express one. Equipments within a ring are linked by fibre or by an optical wavelength.

To summarize the building blocks for the transport segments are:

	Layer 2.0 Building block	Driver Name to Transport segments
Layer2.0 Network Stage Function	NSF_PDH_DigitalCrossConnect	CrossConnected_TimeSlots
	NSF_SDH_Broadcast	Nbr_TV_users Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_Core_Ring	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_Express_Ring	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_Regional_Ring	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_DigitalCrossConnect	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_Grooming	Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)
	NSF_SDH_Point_to_Point	Transported_TimeSlots
Physical layer connectivity service	NLS1_0_Fibre_connect_Backbone_Point2Point	km equivalent fibre pairs consumed
	NLS1_0_Fibre_connect_Backbone_SDH_Core_rings	km*Mbit/s
	NLS1_0_Fibre_connect_Backbone_SDH_Express_rings	km*Mbit/s
	NLS1_0_Fibre_connect_Backbone_SDH_Regional_rings	km*Mbit/s
	NLS1_0_Fibre_connect_to_the_office	Nbr_fibreBundle_Used
Wavelength colouring service	NLS1_1_Add_Drop_lambda_Core	Nbr_of_equivalent_lambda_add_drops
	NLS1_1_Add_Drop_lambda_Express	Nbr_of_equivalent_lambda_add_drops
	NLS1_1_Add_Drop_lambda_Regional	Nbr_of_equivalent_lambda_add_drops
Wavelength end-to-end connectivity service	NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)	Nbr_of_kmxLambda_equivalent_consumed
	NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)	Nbr_of_kmxLambda_equivalent_consumed
	NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)	Nbr_of_kmxLambda_equivalent_consumed

7.7 Network services of the packet based infrastructure

7.7.1 Definition

This layer deals with the data collection services (broadband or dedicated) between the customer and the central office (access) and the transport of data between central offices (backbone). Two technologies coexist as well in the access part as in the backbone part : ATM technology and Ethernet/MPLS technology. Next picture summarizes the end point locations of packet based services.

This layer also integrates point to point dedicated Ethernet transparent connections also named BLES services (Belgacom LAN Extension Service).

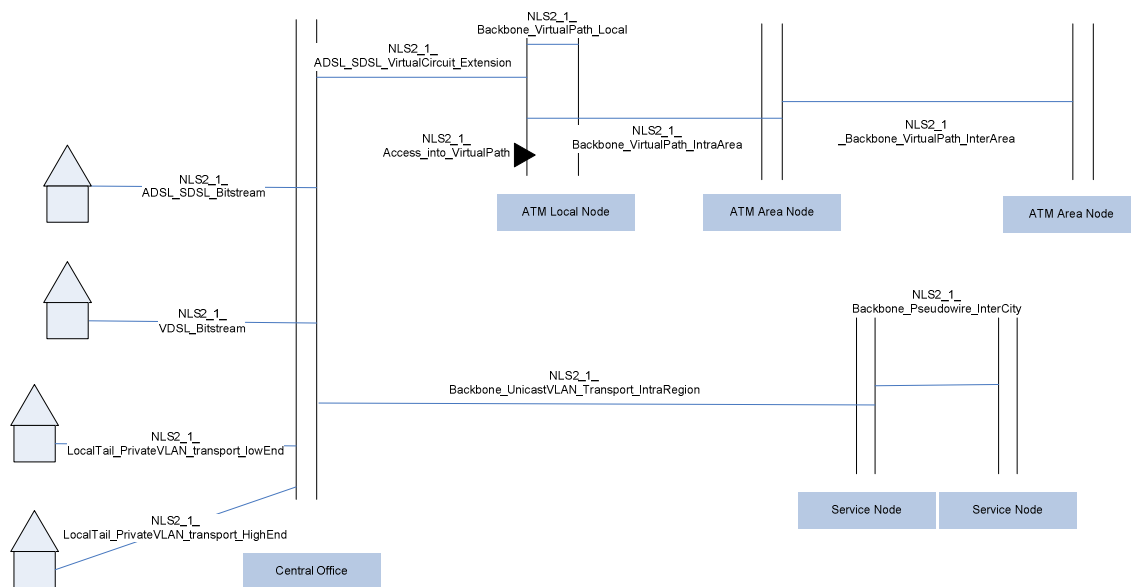


Figure 16

Access part

Layer 2.1 access service	Comment
NLS2_1_ADSL_SDSL_Bitstream	Broadband (ADSL-SDSL) end to end data streams between customer site and aggregation point in central office
NLS2_1_VDSL_Bitstream	Broadband VDSL end to end data streams between customer site and aggregation point in central office
NLS2_1_LocalTail_PrivateVLAN_transport_lowEnd	Ethernet symmetric dedicated link with central office over copper
NLS2_1_LocalTail_PrivateVLAN_transport_HighEnd	Ethernet symmetric dedicated link with central office over fibre
NLS2_1_LocalTailCapacity_Ethernet>=10M	High bandwidth transparent Ethernet frame transport between customer and central office (BLES local tail)

Backbone part

For data transport between central offices, the end point locations of the layer 2.1 services depend on the technology, the underlying networks having different topologies.

For ATM technology , the following services are defined:

Layer 2.1 ATM transport service	Comment
NLS2_1_Backbone_VirtualPath_Local	Transport of virtual circuits in a same ATM path in ATM local point of presence
NLS2_1_Backbone_VirtualPath_IntraArea	Transport of virtual circuits in a same ATM path from an ATM local point of presence up to the area level point of presence
NLS2_1_Backbone_VirtualPath_InterArea	Transport of virtual circuits in a same ATM path between 2 ATM area level point of presence.
NLS2_1_Access_into_VirtualPath	Direct access to a virtual path , allows to inject/eject ATM virtual circuits in/out of a transport virtual path
NLS2_1_ADSL_SDSL_VirtualCircuit_Extension	Extension of the virtual circuits between the central offices and the ATM local point of presence

For the Ethernet/MPLS technology , the following services are defined:

Layer 2.1 Ethernet transport service	Comment
NLS2_1_Backbone_UnicastVLAN_Transport_IntraRegion	MPLS Transport of Ethernet VLANs between a central office and the service node of the region. These VLANs are unicast
NLS2_1_Backbone_Pseudowire_InterCity	MPLS Transport of Ethernet VLANs between service nodes of different regions. These VLANs are unicast
NLS2_1_Backbone_MulticastVPLS_IntraRegion	

Eventually , the dedicated Ethernet transparent connections (BLES service) also introduce backbone connectivity services :

Layer 2.1 Ethernet transparent transport	Comment
NLS2_1_LocalBackboneCapacity_Ethernet>=10M	End points are within the same central office
NLS2_1_IntraZonalBackboneCapacity_Ethernet>=10M	End points are within central offices of same zone
NLS2_1_IntraAreaBackboneCapacity_Ethernet>=10M	End points are within central offices of same area but not within same zone
NLS2_1_InterCityBackboneCapacity_Ethernet>=10M	End points are between two express transmission centers
NLS2_1_InterNationalBackboneCapacity_Ethernet>=10M	

7.7.2 Usage of the data packet infrastructure

The access services of the data packet infrastructure are combined with the data packet backbone services to deliver end-to-end connectivity between IP appliances at customer site (IP router in ADSL/VDSL modems, private LAN IP routers) and IP service nodes , primarily the broadband access servers and the IPVPN routers offering layer3 services like ADSL/SDSL IP collection, VoD IP collection, Private VLAN extensions up to IPVPN nodes.

Next table summarizes the drivers used expressing how NLS2.1 contribute in layer 3 services or directly to End user services.

NLS2.1 service	Driver Name	Upper layer services "consuming" NLS2.1 services
NLS2_1_ADSL_SDSL_Bitstream	Nbr_of_used_xDSL_BROBA_lines	BROBA end user line, all broadband IP collections (public internet, VoD, VoIP), and broadband access to IP VPN
NLS2_1_ADSL_SDSL_VirtualCircuit_Extension	perc	Percentage driver to align bitstream costs with BIPT BROBA model.
NLS2_1_VDSL_Bitstream	Nbr_of_used_VDSL_lines	all broadband IP collections (public internet, VoD, VoIP), and broadband access to IP VPN
NLS2_1_Access_into_VirtualPath	Configured_Bandwidth(Gbps)	Symmetric accesses to IPVPN
NLS2_1_Backbone_MulticastVPLS_IntraRegion	direct	For television
NLS2_1_Backbone_Pseudowire_InterCity	TotalPeakBandwidth_used(Gbps)	Broadband public IP NLS3 service, VoIP , Broadcast TV, and private IPVPN routing
NLS2_1_Backbone_UnicastVLAN_Transport_IntraRegion	EthanePeakHourPeakBandwidth_used(Mbps)	Broadband public IP NLS3 service, VoIP , VoD and access to private IPVPN routing and Ethernet backhaul
NLS2_1_Backbone_VirtualPath_InterArea	VP bandwidth Gbps	
NLS2_1_Backbone_VirtualPath_InterArea	VP equivalent bandwidth Gbps (Topological efficiency and QoS aspects are translated in bandwidth +or- committed bandwidth)	BROBA transport, Broadband public IP NLS3 service, VoIP , VoD and access to private IPVPN routing
NLS2_1_Backbone_VirtualPath_Local	VP equivalent bandwidth Gbps (Topological efficiency and QoS aspects are translated in bandwidth +or- committed bandwidth)	BROBA transport, Broadband public IP NLS3 service, VoIP , VoD and access to private IPVPN routing
NLS2_1_InterCityBackboneCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	BLES EUS services, High capacity accesses to IPVPN, IP-VPN routers interconnection, internal networks routers interconnection
NLS2_1_InterNationalBackboneCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	
NLS2_1_IntraAreaBackboneCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	
NLS2_1_IntrazonalBackboneCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	
NLS2_1_LocalBackboneCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	
NLS2_1_LocalTailCapacity_Ethernet>=10M	Bandwidth consumed (Mbit/s)	

NLS2_1_LocalTail_PrivateVLAN_transport_HighEnd	direct	Access to IPVPN layer 3 services
NLS2_1_LocalTail_PrivateVLAN_transport_lowEnd	direct	Access to IPVPN layer 3 services

7.7.3 Contributors to the data packet infrastructure services

The ATM based layer2.1 services are implemented by the configuration of the ATM network elements (modeled as Network Stage Function) interacting with each other using lower layer connectivity services (see picture Figure 17 - ATM based layer 2.1).

NLS2_1 ADSL SDSL Bitstream is the result of the central office (the Belgacom technical building closest to the end customer) based network stage function **NSF_ADSL_SDSL_Aggregation**.

That function interacts with the broadband CPE equipment (at the customer site) by means of copper connectivity **NLS1_0_Raw_Copper** and **NLS1_0_Intercept_Raw_Copper** and **NLS1_0_Copper_Localloop_testing** (for the monitoring of copper line).

NLS2_1 ADSL SDSL VirtualCircuit Extension is the transportation of aggregated bitstream towards the first ATM network function. This NLS2.1 is directly implemented by connectivity services of layer 2.0: **NLS2_o_IntrazonalBackboneCapacity=2M**, **NLS2_o_IntrazonalBackboneCapacity>2M**, **NLS2_o_LocalBackboneCapacity>2M**, **NLS2_o_IntraAreaBackboneCapacity>2M**, **NLS2_o_InterCityBackboneCapacity>2M**

NLS2_1 Backbone VirtualPath IntraArea is the result of **NSF_ATM_Tributary_Access** to inject the collected traffic into ATM VP , followed by **NSF_ATM_Regional_Transport** function implemented in the **ATM switching units and ATM backbone interfaces**.

The switching units interact with each other using lower level layer connectivity services: **NLS2_0_IntraAreaBackboneCapacity>2M**, **NLS2_0_IntrazonalBackboneCapacity<2M**, **NLS2_0_IntrazonalBackboneCapacity=2M**, **NLS2_0_IntrazonalBackboneCapacity>2M**, **NLS2_0_LocalBackboneCapacity<2M**, **NLS2_0_LocalBackboneCapacity>2M**

NLS2_1 Backbone VirtualPath Local is the result of **NSF_ATM_Tributary_Access** to inject the collected traffic into ATM VP , followed by **NSF_ATM_Regional_Transport** function implemented in the **ATM switching units (no backbone interface as VP remains local in the ATM equipment)**.

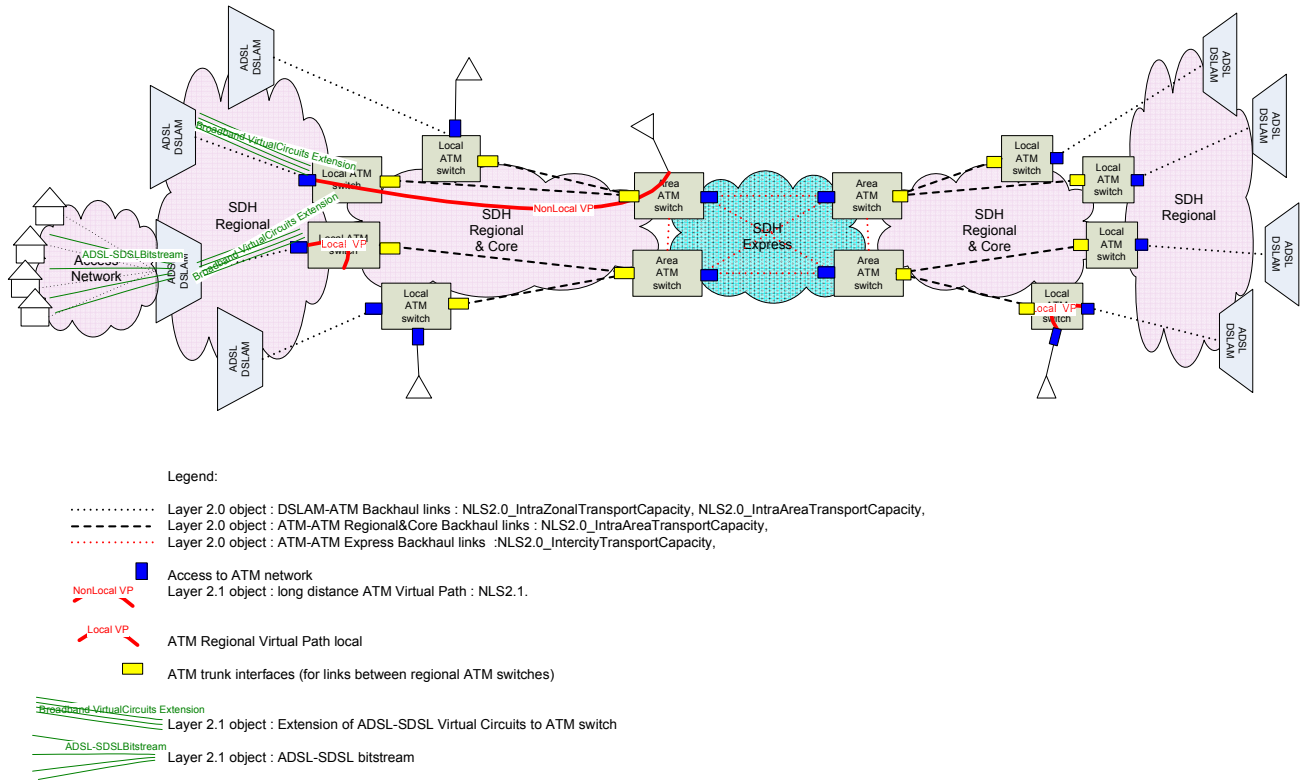


Figure 17 - ATM based layer 2.1

The Ethernet based layer 2.1 services are implemented by the configuration of the Ethernet/MPLS network elements (modeled as Network Stage Function) interacting with each other using lower layer connectivity services (see picture Figure 18 - Ethernet layer 2.1)).

NLS2_1 VDSL Bitstream is the result of the central office (the Belgacom technical building closest to the end customer) based network stage function **NSF_VDSL_Aggregation**.

That function interacts with the broadband CPE equipment (at the customer site) by means of copper connectivity **NLS1_0_Raw_Copper,NLS1_0_Intercept_Raw_Copper, NLS1_0_Copper_Localloop_testing** (for the monitoring of copper line), **NLS1_0_Copper_Subloop, NLS1_0_Intercept_Subloop_Copper, NLS1_0_PowerToTheCurb, NLS1_0_Copper_Localloop_testing, NLS1_0_Fibre_connect_to_the_cabinet, NLS1_0_Fibre_connect_to_the_office** (for subtended optical nodes).

NLS2_1 Backbone UnicastVLAN Transport IntraRegion is the result of the Ethernet/MPLS unicast NSF_Ethernet_Regional_Unicast function present in the deployed Ethernet equipment. The function is activated in different locations to form aggregation clusters , the cluster links are realized using layer 1.1 connectivity (DWDM) and in a limited way direct fibre connectivity.

NLS2_1 LocalTail PrivateVLAN transport HighEnd (LowEnd) are the result of customer sited equipment , the networkstage functions NSF_Ethernet_Access_Line (for high end) and NSF_Ethernet_first_mile (for low end).

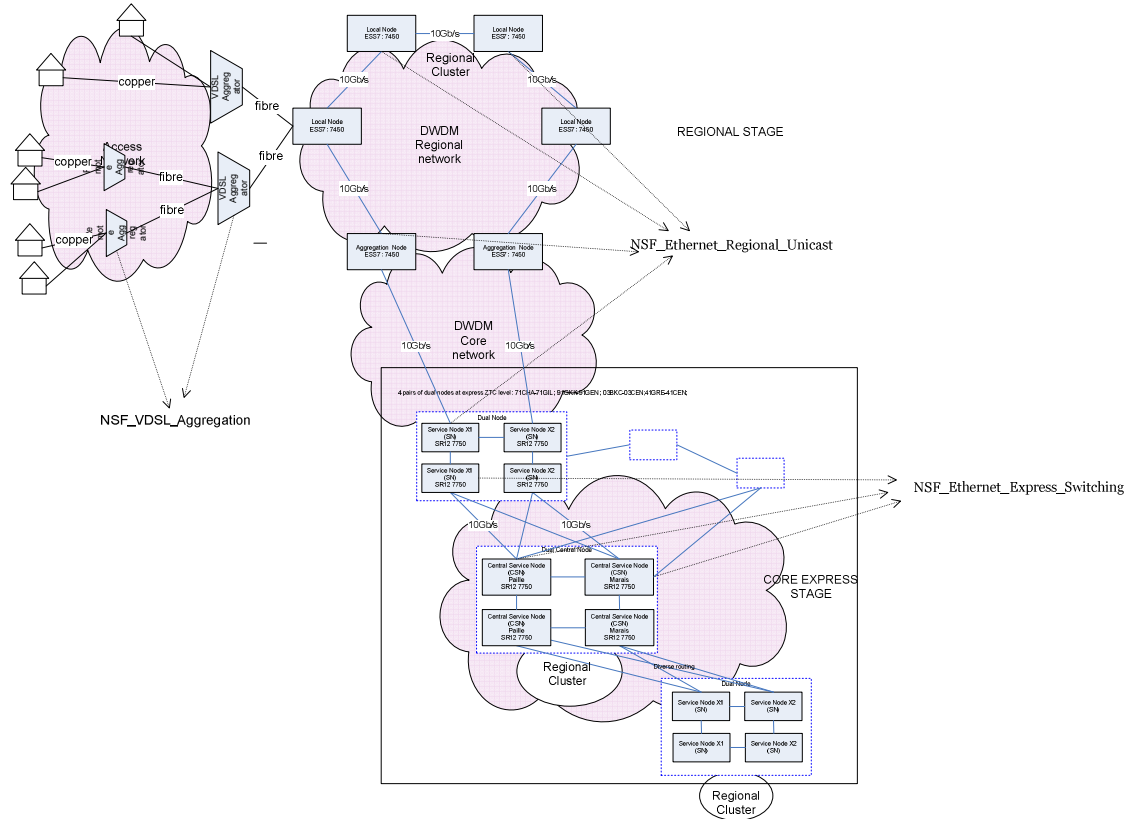


Figure 18 - Ethernet layer 2.1

Finally the dedicated Ethernet transparent connection services NLS2_1_LocalTailCapacity_Ethernet \geq 10M, NLS2_1_XXX_BackboneCapacity_Ethernet \geq 10M are realized either on SDH equipment (up to 100 Mbps), reusing the SDH clusters deployed and already discussed previously, or for very high capacity connections (above 100 Mbps) they are directly realized on a wavelength using directly the NLS1.1 colouring functions (Add_drop_Lambda) for the local tail and NLS1_1_Backbone_transparent_Very_highCap_XXX for the Backbone service.

The table hereunder summarizes the drivers used to distribute the cost contributors to the NLS2.1 services .

NLS2.1 service category	Building block of layer 2.1 service	Driver Name
<u>NLS2_1_Access_into_Vir</u>	NSF_ATM_Tributary_Access	Configured_Bandwidth(Gbps)

tualPath

Broadband aggregation	NLS1_0_Copper_Localloop_testing	nbr of broadband lex based without voice	
	NLS1_0_Copper_Subloop	Direct	
	NLS1_0_Copper_Subloop_testing	Direct	
	NLS1_0_Fibre_connect_Backbone_Point2Point	km equivalent fibre pairs consumed	
	NLS1_0_Fibre_connect_to_the_cabinet	Nbr_Active_Remote_optical_platforms	
	NLS1_0_Fibre_connect_to_the_office	Nbr_fibreBundle_Used	
	NLS1_0_Intercept_Raw_Copper	Nbr_of_used_pairs_LEXbased_ADSL_VDSL_SharedPair	
	NLS1_0_Intercept_Subloop_Copper	Direct	
	NLS1_0_PowerToTheCurb	Direct	
	NLS1_0_Raw_Copper	Nbr_of_used_pairs	
	NLS2_0_IntraAreaBackboneCapacity>2M	Bandwidth consumed (Mbit/s)	
	NLS2_0_IntrazonalBackboneCapacity>2M	Bandwidth consumed (Mbit/s)	
	NLS2_0_LocalBackboneCapacity>2M	Bandwidth consumed (Mbit/s)	
	NSF_ADSL_SDSL_Aggregation	Nbr_ADSL_SDSL_lines_used	
	NSF_ATM_Tributary_Access	Configured_Bandwidth(Gbps)	
	NSF_VDSL_Aggregation	Nbr_VDSL_lines_used	
	ATM & Ethernet transport	NLS1_0_Fibre_connect_Backbone_Ethernet_Express_clusters	Direct
		NLS1_0_Fibre_connect_Backbone_Ethernet_Regional_clusters	Broadcast_nonBroadcast_Trunk_capacity(Gbps)
		NLS1_0_Fibre_connect_to_the_office	Nbr_fibreBundle_Used
		NLS1_1_Add_Drop_lambda_Core	Nbr_of_equivalent_lambda_add_drops
NLS1_1_Add_Drop_lambda_Express		Nbr_of_equivalent_lambda_add_drops	
NLS1_1_Add_Drop_lambda_Regional		Nbr_of_equivalent_lambda_add_drops	
NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS2_0_InterCityBackboneCapacity<2M		Bandwidth consumed (Mbit/s)	
NLS2_0_InterCityBackboneCapacity>2M		Bandwidth consumed (Mbit/s)	
NLS2_0_IntraAreaBackboneCapacity>2M		Bandwidth consumed (Mbit/s)	
NLS2_0_IntrazonalBackboneCapacity<2M		Bandwidth consumed (Mbit/s)	
NLS2_0_IntrazonalBackboneCapacity=2M		Bandwidth consumed (Mbit/s)	
NLS2_0_IntrazonalBackboneCapacity>2M		Bandwidth consumed (Mbit/s)	
NLS2_0_LocalBackboneCapacity<2M		Bandwidth consumed (Mbit/s)	
NLS2_0_LocalBackboneCapacity>2M		Bandwidth consumed (Mbit/s)	

	NSF_ATM_Regional_Transport	Equivalent Switched Amount(Gbps)	
	NSF_ATM_Tributary_Access	Configured_Bandwidth(Gbps)	
	NSF_Ethernet_Express_IO	Consumed_capacity(Gbps)	
	NSF_Ethernet_Express_Switching	Consumed_capacity(Gbps)	
	NSF_Ethernet_Regional_Unicast	Consumed_capacity(Gbps)	
NLS1_1_Backbone_MulticastVPLS_IntraRegion	NLS1_0_Fibre_connect_Backbone_Ethernet_Regional_clusters	Broadcast_nonBroadcast_Trunk_capacity(Gbps)	
	NLS1_0_Fibre_connect_to_the_office	Nbr_fibreBundle_Used	
	NLS1_1_Add_Drop_lambda_Core	Nbr_of_equivalent_lambda_add_drops	
	NLS1_1_Add_Drop_lambda_Express	Nbr_of_equivalent_lambda_add_drops	
	NLS1_1_Add_Drop_lambda_Regional	Nbr_of_equivalent_lambda_add_drops	
	NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	
	NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	
	NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)	Nbr_of_kmxLambda_equivalent_consumed	
	NSF_Ethernet_Regional_Multicast	Consumed_capacity(Gbps)	
	Transparent Ethernet connection services	NLS1_0_Fibre_connect_Backbone_Point2Point	km equivalent fibre pairs consumed
		NLS1_0_Fibre_connect_Backbone_SDH_Core_rings	km*Mbit/s
		NLS1_0_Fibre_connect_Backbone_SDH_Express_rings	km*Mbit/s
		NLS1_0_Fibre_connect_Backbone_SDH_Regional_rings	km*Mbit/s
NLS1_0_Fibre_connect_to_the_office		Nbr_fibreBundle_Used	
NLS1_1_Add_Drop_lambda_Core		Nbr_of_equivalent_lambda_add_drops	
NLS1_1_Add_Drop_lambda_Express		Nbr_of_equivalent_lambda_add_drops	
NLS1_1_Add_Drop_lambda_Regional		Nbr_of_equivalent_lambda_add_drops	
NLS1_1_Backbone_transparent_Very_highCap_Core(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS1_1_Backbone_transparent_Very_highCap_Express(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS1_1_Backbone_transparent_Very_highCap_Regional(DWDM)		Nbr_of_kmxLambda_equivalent_consumed	
NLS1_1_LocalTail_transparent_Very_highCap(WDM)(incl_BLES)		Nbr_of_lambdas_usedby_customerEquipment Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	
NSF_SDH_Core_Ring		Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	
NSF_SDH_DigitalCrossConnect		Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	
NSF_SDH_Express_Ring		Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	
NSF_SDH_Grooming		Consumed equivalent bandwidth in regard to reference system(Gb/s) (considering the cost of one TimeSlot in this category)	
NSF_SDH_Point_to_Point		Transported_TimeSlots	
NSF_SDH_Regional_Ring	Consumed equivalent bandwidth in regard to reference		

		system(Gb/s) (considering the cost of one TimeSlot in this category)
Ethernet local tail	NLS1_0_Continue_Raw_Copper	Nbr_of_used_pairs
	NLS1_0_Raw_Copper	Nbr_of_used_pairs
	NSF_Ethernet_Access_Line	Nbr_EAL_lines_used
	NSF_Ethernet_first_mile	Nbr_EFM_lines_used

7.8 Network services of the IP infrastructure layer (NLS3-IP)

7.8.1 Scope

This layer provides the following basic IP services in the model.

IP service type	IP service
Collection of IP traffic for public internet or internal internet	NLS3_ADSL_Public_IP_collection
	NLS3_SDSL_Public_IP_collection
	NLS3_VDSL_Public_IP_collection
	NLS3_VoD_IP_collection
	NLS3_VoIP_IP_collection
Public Internet routing	NLS3_Public_IP_switching
Connection of IP sites to IP-VPN	NLS3_Private_IP&Ethernet_Extension_on_symmetric_HighEnd
	NLS3_Private_IP&Ethernet_Extension_on_symmetric_LowEnd
	NLS3_Private_IP&Ethernet_Routing
	NLS3_Private_IP&Ethernet_Extension_on_asymmetric
	NLS3_Private_IP&Ethernet_Extension_on_symmetric_Datacenter
IP security	NLS3_IP_security

The actual NLS3's are described next. A comprehensive listing of which NLS or EUS they contribute to together with a description of the driver utilized in each case is also presented. Finally, a table will exhibit the cost allocation of these layer services, including driver and driver volume.

7.8.1.1 Public services

7.8.1.1.1 IP_collection

Gathers all the data traffic, except that of the private networks, generated by the customers at their locations -homes and offices placed all over the country- at the highest network level where it can be further delivered to the Internet.

This gathering is achieved thanks to the broad and narrow band servers together with the connectivity capabilities of the ATM and MPLS backbone networks.

This generic service is in fact divided in several actual NLS3, depending on the traffic type and/or underlying technology, as follows:

- Data traffic:
 - NLS3_ADSL_Public_IP_Collection
 - NLS3_SDSL_Public_IP_Collection
 - NLS3_VDSL_Public_IP_Collection
- Video on Demand traffic:
 - NLS3_VoD_IP_Collection
- Voice over IP traffic:
 - NLS3_VoIP_IP_Collection

Further, these NLS3's contribute to the following higher network layer services and end user services (EUS) and they do it as specified hereunder:

- Each of the “data traffic” IP collection contributes to the EUS_FastInternet and the corresponding EUS_xDSL_Carrier_wholesale, according to its technology. The cost allocation of each NLS3 into the peer EUS is done based on the driver “Nbr_of_retail_wholesale_xDSL_lines” -where the “x” must be substituted by the appropriate letter according to the treated technology- so that the cost proportion of the retail lines will be allocated to EUS_FastInternet and that of the wholesale lines to EUS_xDSL_Carrier_wholesale.
- NLS3_VoD_IP_Collection and NLS3_VoIP_IP_Collection and directly, fully and respectively allocated to NLS4.o_VoD and NLS4.o_VoIP.

7.8.1.1.2 Public_IP_switching

This service brings the intelligence to route the gathered traffic by the “IP_collection” generic NLS3 into the appropriate external network within the “public Internet”.

This service, NLS3_Public_IP_switching, is fully and exclusively realized by the Belgacom Internet Routers and is totally dedicated to the end user service EUS_Fast_Internet.

7.8.1.2 Private services

7.8.1.2.1 Private_IP&Ethernet_Extension

This NLS transparently extends the customer's private local area networks, situated at any location within Belgium, to the edge of the Belgacom's network, thanks to the routers installed at the customer premises (CPE) and the connectivity capabilities of the ATM and MPLS aggregation and core- clouds.

This generic service consists in fact of several actual services, specific to the access technology type, as follows:

- NLS3_Private_IP&Ethernet_Extension_on_symmetric_Datacenter
- NLS3_Private_IP&Ethernet_Extension_on_asymmetric
- NLS3_Private_IP&Ethernet_Extension_on_symmetric_lowEnd
- NLS3_Private_IP&Ethernet_Extension_on_symmetric_highEnd

Regarding the higher level NLS/EUS to which the above NLS3's deliver their services and their costs allocations:

- The “Extension_on_symmetric_Datacenter“ service only supports the EUS_Private_IP&Ethernet_on_symmetric_Datacenter and therefore the NLS costs are fully allocated to the EUS (Driver=>direct).
- Each of the remaining three NLS3’s offers its services to its analogous “EUS_Private_IP&Ethernet...” and to EUS_Private_IP&Ethernet_on_backup. The NLS costs are allocated according to the number of main and backup accesses, respectively. This driver is generically named “Nbr_sites_xxxx”, where xxxx needs to be replaced by the appropriate collection of access technologies depending on the addressed NLS3, i.e. Nbr_sites_ADSL_VDSL.

7.8.1.2.2 NLS3_Private_IP&Ethernet_Routing

This NLS delivers the capability of routing the private networks traffic to the requested end point, within the Belgacom private IPVPN network.

This service, NLS3_Private_IP&Ethernet_Routing, is completed by the Belgacom IPVPN Routers and the core MPLS cloud and, in turn, supports all the “EUS_Private_IP&Ethernet...”.

The costs of this NLS3 are distributed over all the target EUS according to the amount of traffic routed by the Belgacom Private IP network at its busy hour that is generated by the corresponding collection of accesses types (i.e. international, asymmetric, etc...) to the EUS. This driver is named “TotalPeakBandwidth_used(Gbps)”.

Figure 19 exhibits the layer’s basic topology and all the contributors to the Layer 3 services.

NLS3 - IP

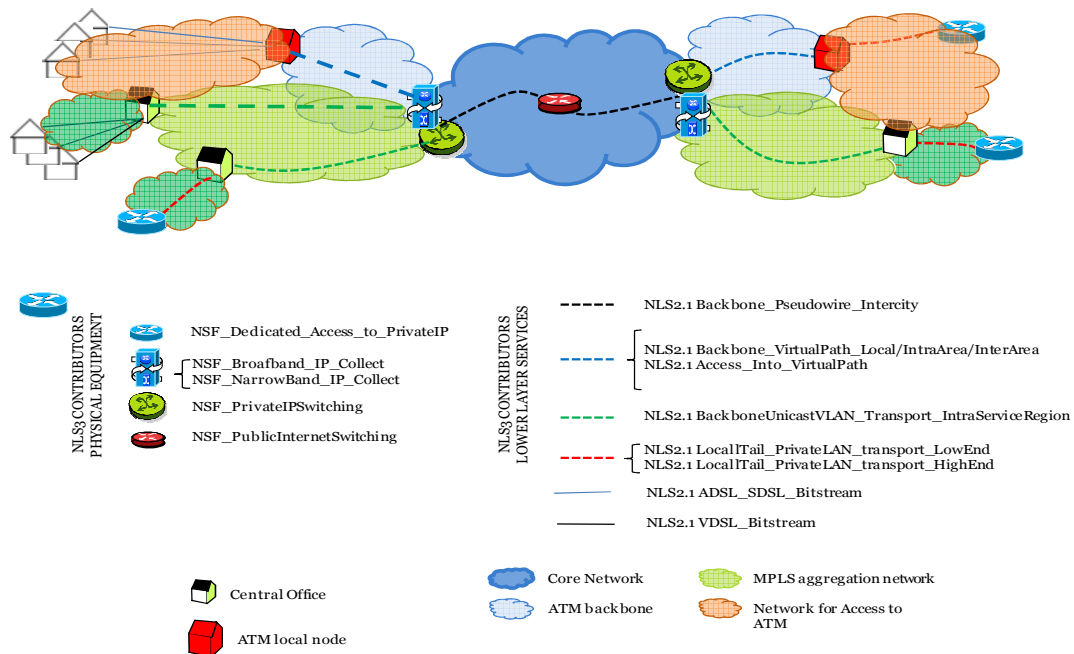



Figure 19: Layer 3 topology and contributors

7.8.2 Contributors to the Network Layer 3 services

7.8.2.1 Components (Physical equipment)



At this layer, a clear distinction appears between the equipment and offered services for private/corporate networks, namely IP-VPN services, and that for the public network.

- Related to private networks:
 -  Customer Premises Equipment (CPE): This is to say the switches/routers located at the customer's premises all over the country. Their costs are grouped into the NSF_Dedicated_Access_to_PrivateIP.

Since the costs borne by this NSF are allocated to several NLS3's, as follows:

- NLS3_Private_IP&Ethernet_Extension_on_asymmetric
- NLS3_Private_IP&Ethernet_Extension_on_symmetric_LowEnd
- NLS3_Private_IP&Ethernet_Extension_on_symmetric_HighEnd


the driver for such allocation is the number of accesses for the corresponding access type (asymmetric, symmetric...). This driver is named "Nbr_of_Sites".

-  Provider Edge (PE) routers for IPVPN or VPLS: These MPLS routers, located at major Belgacom regional nodes distributed throughout the country, carry out the actual corporate networks data routing. The Network Stage Function NSF_PrivateIPSwitching bears their total costs.
- Related to the "public" network:
 -  Network Access Servers: ensure the authentication and authorization of the users, control the users' down and upstream, concentrate the traffic received from the access side and routes it towards the right ISP. Belgacom utilizes two types:
 - BAS and MSR (Broadband Access Server & Multi Service Router): their costs are allocated into different NSF depending on the traffic type:
 - NSF_Broadband_Public_IP_Collect
 - NSF_Broadband_VoD_IP_Collect
 - NSF_Broadband_VoIP_IP_Collect

The driver used for such distribution is the "Total_tributary_capacity(Gbps)", which is installed I/O capacity on the equipment interface for each type of traffic.




Further, these NSF are allocated into NLS3's as follows:

- NSF_Broadband_Public_IP_Collect is distributed through all the NLS3_xDSL_Public_IP_Collection services, where the x stands for any of the three possible DSL flavors –ADSL, SDSL, VDSL-. The driver used in this case is "PeakHour_PublicInternetTraffic(Gbps)", meaning that the costs will be allocated according to the amount of internet traffic carried by the Belgacom public network at the internet traffic busy hour generated by the different DSL types.
- NSF_Broadband_VoD_IP_Collect is directly allocated to NLS3_VoD_IP_Collection, although the driver

- “PeakHour_VoDTraffic(Gbps)” –carried VoD traffic at the VoD busy hour- has been assigned to it.
- NSF_Broadband_VoIP_IP_Collect: direct allocation to NLS3_VoIP_IP_Collection.
 - ”NarrowBandAccessServer”: the costs are grouped into NE_NarrowbandAccessServer and directly allocated to NSF_NarrowBand_IP_Collect
 -  Collection of IP equipments -FIFA routers, acting as gateway to the “Public Internet” and located at a very reduced number of key Belgacom technical buildings. Their costs are summed up into the Network Stage Function NSF_PublicInternetSwitching which in turn are directly allocated to NLS3_Public_IP_switching via the driver “TotalPeakHour_PublicInternetTraffic(Gbps)”, that is to say retail Internet traffic at Internet Busy Hour.

7.8.2.2 Lower layer services

At this layer, the clouds provide the NLS3’s with connectivity, allowing the transmission of data amongst the Layer 3 equipments. The clouds deliver services to both private and public service meanwhile the tails are specific to the private networks. These clouds are:

- ATM based cloud  :
 - NLS2.1_ADSL_SDSL_Bitstream
 - NLS2.1_VDSL_Bitstream
 - NLS2.1_Access_into_VirtualPath
- Ethernet based cloud  :
 - NLS2.1_Backbone_UnicastVLAN_Transport_IntraServiceRegion
 - NLS2.1_Backbone_Pseudowire_InterCity
- Access network  :
 - NLS2.1_LocalTail_PrivateVLAN_transport_lowEnd
 - NLS2.1_LocalTail_PrivateVLAN_transport_HighEnd

These clouds are described in their corresponding layer.

7.9 Network Services of the application layer

7.9.1 Definition

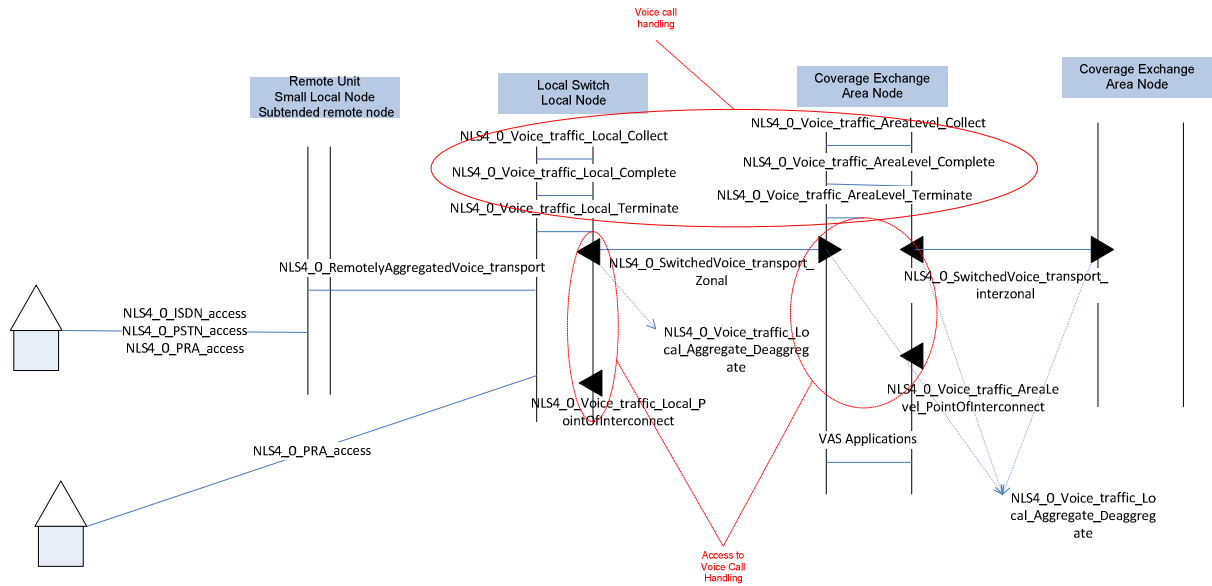
This layer deals with the telecommunication application services to end users. The application layer services are :

NLS4_o_BroadcastTV, NLS4_o_VoD and 36 voice telephony related services classified as follows:

CLASS	DEF_NLS_DESCR
NP	NLS4_0_FixedPortableNumberLocation

	NLS4_0_Public_NumberPortability
Special	NLS4_0_Automated_call_distribution
	NLS4_0_PublicPayphones
Telephony Access	NLS4_0_ISDN_access
	NLS4_0_ISDN-PRA_access
	NLS4_0_PSTN_access
VAS application	NLS4_0_Advanced_Number_Translation_CallHandling
	NLS4_0_CallerIdentity_CallHandling
	NLS4_0_CallingCard_CallHandling
	NLS4_0_InteractiveVoiceResponse_CallHandling
	NLS4_0_MessageWaitingIndicator_Inserting
	NLS4_0_OtherAdvanced_CallHandling
	NLS4_0_PrepaidCallingCard_CallHandling
	NLS4_0_Service_Announcements_Playing
	NLS4_0_Tele voting_CallHandling
	NLS4_0_VirtualPrivateNetwork_CallHandling
	NLS4_0_VoiceFeatures_SelfManaging
	NLS4_0_Voicemail&Messaging
	NLS4_0_WakeUp_CallHandling
Access to VoiceCallHandling	NLS4_0_Voice_traffic_AreaLevel_Aggregate_Deaggregate
	NLS4_0_Voice_traffic_AreaLevel_PointOfInterconnect
	NLS4_0_Voice_traffic_Local_Aggregate_Deaggregate
	NLS4_0_Voice_traffic_Local_PointOfInterconnect
VoiceCallHandling	NLS4_0_Voice_traffic_AreaLevel_Collect
	NLS4_0_Voice_traffic_AreaLevel_Complete
	NLS4_0_Voice_traffic_AreaLevel_Terminate
	NLS4_0_Voice_traffic_AreaLevel_Transit
	NLS4_0_Voice_traffic_Local_Collect
	NLS4_0_Voice_traffic_Local_Complete
	NLS4_0_Voice_traffic_Local_Terminate
Voice transport	NLS4_0_RemotelyAggregatedVoice_transport
	NLS4_0_SwitchedVoice_transport_interzonal
	NLS4_0_SwitchedVoice_transport_National_offnet
	NLS4_0_SwitchedVoice_transport_zonal

For the access, the voice application services are end-to-end voice connections between the customer site and the central office (technical building closest to the user) . For the backbone voice applications are either pure call handling related and do not span over distant nodes, or they are voice transport applications between distant nodes . Next picture puts into perspective the services of the Voice application layer.



7.9.2 Usage of the application layer

The TV related applications are completely used for iDTV end-user services, no specific consumption driver needs to be defined.

The voice application services are distributed to a variety of traffic types , each with a specific driver. The following table summarizes the used drivers per voice application service.

Class of application service	Voice application service	Driver to distribute the NLS4.0 application service to EUS or NLS4.1
Access to VoiceCallHandling	NLS4_0_Voice_traffic_AreaLevel_Aggregate_Deaggregate	routed min
	NLS4_0_Voice_traffic_AreaLevel_PointOfInterconnect	TimeSlotEquivalent_capacity_used
	NLS4_0_Voice_traffic_Local_Aggregate_Deaggregate	routed min
	NLS4_0_Voice_traffic_Local_PointOfInterconnect	TimeSlot_capacity_used
NP	NLS4_0_FixedPortableNumberLocation	Nbr_calls
	NLS4_0_Public_NumberPortability	Nbr_of_ported_numbers
Telephony Access	NLS4_0_ISDN_access	Nbr_lines_inUse
	NLS4_0_ISDN-PRA_access	Nbr_lines_inUse
	NLS4_0_PSTN_access	Nbr_lines_inUse
VAS application	NLS4_0_Advanced_Number_Translation_CallHandling	NumberTranslationProcessedTime(min)
	NLS4_0_CallerIdentity_CallHandling	Direct
	NLS4_0_CallingCard_CallHandling	Direct
	NLS4_0_InteractiveVoiceResponse_CallHandling	Direct
	NLS4_0_MessageWaitingIndicator_Inserting	Direct
	NLS4_0_OtherAdvanced_CallHandling	Direct
	NLS4_0_PrepaidCallingCard_CallHandling	Direct
	NLS4_0_Service_Announcements_Playing	Nbr_calls
NLS4_0_Tele voting_CallHandling	Nbr_calls_explosive_traffic	

	NLS4_0_VirtualPrivateNetwork_CallHandling	Direct
	NLS4_0_VoiceFeatures_SelfManaging	Direct
	NLS4_0_Voicemail&Messaging	Direct
	NLS4_0_WakeUp_CallHandling	Direct
Voice transport	NLS4_0_RemotelyAggregatedVoice_transport	routed min
	NLS4_0_SwitchedVoice_transport_interzonal	routed min
	NLS4_0_SwitchedVoice_transport_National_offnet	TimeSlotEquivalent_capacity_used
	NLS4_0_SwitchedVoice_transport_zonal	routed min
VoiceCallHandling	NLS4_0_Voice_traffic_AreaLevel_Collect	routed min
	NLS4_0_Voice_traffic_AreaLevel_Complete	routed min
	NLS4_0_Voice_traffic_AreaLevel_Terminate	routed min
	NLS4_0_Voice_traffic_AreaLevel_Transit	routed min
	NLS4_0_Voice_traffic_Local_Collect	routed min
	NLS4_0_Voice_traffic_Local_Complete	routed min
	NLS4_0_Voice_traffic_Local_Terminate	routed min

The driver “routed minutes” consists in determining the average nbr of times (=routing factor) a traffic type is using the voice application service across all possible call scenarios compatible with the traffic type. The routed minutes result from multiplication of the routing factor with the amount of calls (expressed in minutes) of that traffic type.

The traffic types (“consumers”) of these voice applications are:

Class of voice application	Traffic type
Access to VoiceCallHandling	

- EUS_Carrier PreSelection IAA interconnection
- EUS_Consumtel 090x Traffic
- EUS_DCIA traffic
- EUS_EAA interconnection - BGC to Fixed
- EUS_EAA interconnection - BGC to Mobile
- EUS_Freephone Traffic
- EUS_IAA interconnection - Mobile to BGC
- EUS_IAA interconnection - BGC to Mobile
- EUS_interzonal traffic
- EUS_National Transit (M)OLO traffic EAA interconnection
- EUS_Split Charging Traffic
- EUS_Universal Access Number Traffic
- EUS_Voice_traffic_IAA_PointOfInterconnect
- EUS_Voice_traffic_Local_PointOfInterconnect
- EUS_zonal non local traffic
- NLS4_1_EAA interconnection - Fixed to BGC
- NLS4_1_EAA interconnection - Mobile to BGC
- NLS4_1_IAA interconnection - BGC to Fixed
- NLS4_1_IAA interconnection - Fixed to BGC
- NLS4_1_Incoming International Traffic
- NLS4_1_INTERNET TRAFFIC
- NLS4_1_Outgoing International Traffic
- NLS4_1_Transit International (M)OLO Traffic EAA

NP

- EUS_IAA interconnection - BGC to Fixed
- EUS_Incoming International Transit (M)OLO Traffic
- EUS_National Transit (M)OLO traffic EAA interconnection
- EUS_National Transit (M)OLO traffic IAA interconnection
- EUS_Number Portability access per line
- EUS_Other_Traffic

Special

- EUS_AUTOMATEDCALLDISTRIBUTION
- EUS_Payphones

Telephony Access

- EUS_ISDN-BA normal subscription
- EUS_ISDN-PRA subscription
- EUS_Private_IP&Ethernet_on_backup
- EUS_PSTN subscription

VAS application

- EUS_Calling Card Postpaid Traffic
- EUS_Calling Card Prepaid Traffic
- EUS_Carrier PreSelection IAA interconnection
- EUS_Carrier PreSelection local interconnection
- EUS_Consultel 090x Traffic
- EUS_Consultel 090x Traffic - BGC to Fixed
- EUS_Consultel 090x Traffic - OLO to BGC
- EUS_Freephone Traffic
- EUS_Freephone Traffic - BGC to Fixed
- EUS_Freephone Traffic - OLO to BGC
- EUS_IAA interconnection - Mobile to BGC
- EUS_IAA interconnection - BGC to Mobile
- EUS_Incoming International Freephone Traffic
- EUS_Incoming International Transit (M)OLO Traffic
- EUS_international traffic incoming
- EUS_Local interconnection - OLO to BGC
- EUS_local traffic
- EUS_MVAS
- EUS_National Transit (M)OLO traffic EAA interconnection
- EUS_National Transit (M)OLO traffic IAA interconnection
- EUS_notAllocated
- EUS_Other_Traffic
- EUS_Outgoing International Freephone traffic
- EUS_Outgoing International Transit (M)OLO Traffic
- EUS_Split Charging Traffic
- EUS_Split Charging Traffic - BGC to Fixed
- EUS_Split Charging Traffic - OLO to BGC
- EUS_Universal Access Number Traffic
- EUS_Universal Access Number Traffic - BGC to Fixed
- EUS_Universal Access Number Traffic - OLO to BGC
- EUS_zonal non local traffic
- NLS4_1_IAA interconnection - BGC to Fixed
- NLS4_1_IAA interconnection - Fixed to BGC
- NLS4_1_interzonal A traffic
- NLS4_1_interzonal B traffic
- NLS4_1_Outgoing International Traffic

Voice transport

EUS_Carrier PreSelection IAA interconnection
EUS_Carrier PreSelection local interconnection
EUS_Consultel 090x Traffic
EUS_DCIA traffic
EUS_EAA interconnection - BGC to Fixed
EUS_EAA interconnection - BGC to Mobile
EUS_Freephone Traffic
EUS_IAA interconnection - Mobile to BGC
EUS_IAA interconnection - BGC to Mobile
EUS_interzonal traffic
EUS_Local interconnection - OLO to BGC
EUS_local traffic
EUS_National Transit (M)OLO traffic EAA interconnection
EUS_Split Charging Traffic
EUS_Universal Access Number Traffic
EUS_zonal non local traffic
NLS4_1_EAA interconnection - Fixed to BGC
NLS4_1_EAA interconnection - Mobile to BGC
NLS4_1_IAA interconnection - BGC to Fixed
NLS4_1_IAA interconnection - Fixed to BGC
NLS4_1_Incoming International Traffic
NLS4_1_INTERNET TRAFFIC
NLS4_1_interzonal A traffic
NLS4_1_interzonal B traffic
NLS4_1_Outgoing International Traffic
NLS4_1_Transit International (M)OLO Traffic EAA

VoiceCallHandling

EUS_Carrier PreSelection IAA interconnection
EUS_Carrier PreSelection local interconnection
EUS_Consultel 090x Traffic
EUS_DCIA traffic
EUS_EAA interconnection - BGC to Fixed
EUS_EAA interconnection - BGC to Mobile
EUS_Freephone Traffic
EUS_IAA interconnection - Mobile to BGC
EUS_IAA interconnection - BGC to Mobile
EUS_interzonal traffic
EUS_Local interconnection - OLO to BGC
EUS_local traffic
EUS_National Transit (M)OLO traffic EAA interconnection
EUS_National Transit (M)OLO traffic IAA interconnection
EUS_Split Charging Traffic
EUS_Universal Access Number Traffic
EUS_zonal non local traffic
NLS4_1_EAA interconnection - Fixed to BGC
NLS4_1_EAA interconnection - Mobile to BGC
NLS4_1_IAA interconnection - BGC to Fixed

NLS4_1_IAA interconnection - Fixed to BGC
 NLS4_1_Incoming International Traffic
 NLS4_1_INTERNET TRAFFIC
 NLS4_1_Outgoing International Traffic
 NLS4_1_Transit International (M)OLO Traffic EAA
 NLS4_1_Transit International (M)OLO Traffic IAA

7.9.3 Contributors to the application services

Voice application services in the access

PSTN and ISDN access services are the result of the voice concentrator function in the closest technical building (local switch or remote unit) and the physical copper connectivity between the customer site and the technical building. In addition, the data connectivity required to transport Voice over IP signaling and traffic to the Voice over IP switching units is also included as a contributor to voice access.

PRA access services do not need a concentrator function (that function is typically realized within the customer site by private switches) but merely a voice transport link to the local switch. This one obtained directly from layer 2.0 transport segments and local tails.

Hereunder a summary of the contributors to voice access together with the drivers used to determine their level of involvement in the service:

Voice access service	Contributor	Driver Name
NLS4_0_ISDN_access	NLS1_0_Continue_Raw_Copper	Nbr_of_used_pairs
	NLS1_0_Raw_Copper	Nbr_of_used_pairs
	NSF_ISDN_NetworkTermination	Nbr_of_accesses
	NSF_ISDN_Voice_concentrator	Nbr_lines_inUse
NLS4_0_PSTN_access	NLS1_0_Continue_Raw_Copper	Nbr_of_used_pairs
	NLS1_0_Raw_Copper	Nbr_of_used_pairs
	NLS3_VoIP_IP_collection	Direct
	NSF_PairGainSystem	Direct
	NSF_PSTN_Voice_concentrator	Nbr_lines_inUse
NLS4_0_ISDN-PRA_access	NLS2_0_InterCityBackboneCapacity=2M	Bandwidth consumed (Mbit/s)
	NLS2_0_IntraAreaBackboneCapacity=2M	Bandwidth consumed (Mbit/s)
	NLS2_0_IntrazonalBackboneCapacity=2M	Bandwidth consumed (Mbit/s)
	NLS2_0_LocalBackboneCapacity=2M	Bandwidth consumed (Mbit/s)
	NLS2_0_LocalTailCapacity	Bandwidth consumed (Mbit/s)
	NSF_ISDN_Primary_Access	Nbr_lines_inUse

Voice application services in the backbone (see picture Figure 20 - Switching Network)

The services in the group “Access to VoiceCallHandling” allow to access the switching matrix and call handling , they are realized by ports to the switch (a switch port concentrates the voice circuits from/to the switching matrix). The switching ports (trunks) can be those of a local switch or of a transit switch .

For the case of interconnection with other operators (NLS4_o_Voice_traffic_AreaLevel_PointOfInterconnect, NLS4_o_Voice_traffic_Local_PointOfInterconnect) , the charging function of the switch is also exercised in order to allow for interoperator billing.

In summary the contributors are distributed using following drivers:

Network functions used to realize Access to VoiceCallHandling services	Driver used to attribute network functions to access to VoiceCallHandling services
NSF_Voice_call_CAE_charging	RoutedMin
NSF_Voice_call_CAE_Trunks	TimeSlot_capacity_used
NSF_Voice_call_Local_charging	RoutedMin
NSF_Voice_call_Local_Trunks	TimeSlot_capacity_used

The services in the group “VoiceCallHandling” result from three network stage functions:

NSF_Voice_call_CAE_Processing
 NSF_Voice_call_Local_Processing
 NSF_Voice_call_Local_charging

The driver used is “routed minutes” and it consists in determining the average nbr of times (=routing factor) a voice call handling type is using the network functions . The routed minutes result from multiplication of the routing factor with the amount of calls (expressed in minutes) exercising that voice call handling type.

Network function		Driver Name
NSF_Voice_call_CAE_Processing	NLS4_0_Voice_traffic_AreaLevel_Collect	RoutedMin
	NLS4_0_Voice_traffic_AreaLevel_Complete	RoutedMin
	NLS4_0_Voice_traffic_AreaLevel_Terminate	RoutedMin
	NLS4_0_Voice_traffic_AreaLevel_Transit	RoutedMin
NSF_Voice_call_Local_charging	NLS4_0_Voice_traffic_Local_Collect	RoutedMin
	NLS4_0_Voice_traffic_Local_Complete	RoutedMin
NSF_Voice_call_Local_Processing	NLS4_0_Voice_traffic_Local_Collect	RoutedMin
	NLS4_0_Voice_traffic_Local_Complete	RoutedMin
	NLS4_0_Voice_traffic_Local_Terminate	RoutedMin

The services in the group “Voice transport” are emanating from layer 2.0 Backbone transport capacity (<2M) which are distributed according to the consumed bandwidth.

The services in the group “VAS application” are in fact directly identified with a network function:

NSF_Advanced_Number_Translation_CallHandling	NLS4_0_Advanced_Number_Translation_CallHandling	direct
NSF_CallerIdentity_CallHandling	NLS4_0_CallerIdentity_CallHandling	direct
NSF_CallingCard_CallHandling	NLS4_0_CallingCard_CallHandling	direct
NSF_InteractiveVoiceResponse_CallHandling	NLS4_0_InteractiveVoiceResponse_CallHandling	direct
NSF_MessageWaitingIndicator_Inserting	NLS4_0_MessageWaitingIndicator_Inserting	direct
NSF_OtherAdvanced_CallHandling	NLS4_0_OtherAdvanced_CallHandling	direct
NSF_PrepaidCallingCard_CallHandling	NLS4_0_PrepaidCallingCard_CallHandling	direct
NSF_Service_Announcements_Playing	NLS4_0_Service_Announcements_Playing	direct
NSF_Televoiting_CallHandling	NLS4_0_Televoiting_CallHandling	direct
NSF_VirtualPrivateNetwork_CallHandling	NLS4_0_VirtualPrivateNetwork_CallHandling	direct
NSF_VoiceFeatures_SelfManaging	NLS4_0_VoiceFeatures_SelfManaging	direct
NSF_Voicemail&Messaging	NLS4_0_Voicemail&Messaging	direct
NSF_WakeUp_CallHandling	NLS4_0_WakeUp_CallHandling	direct

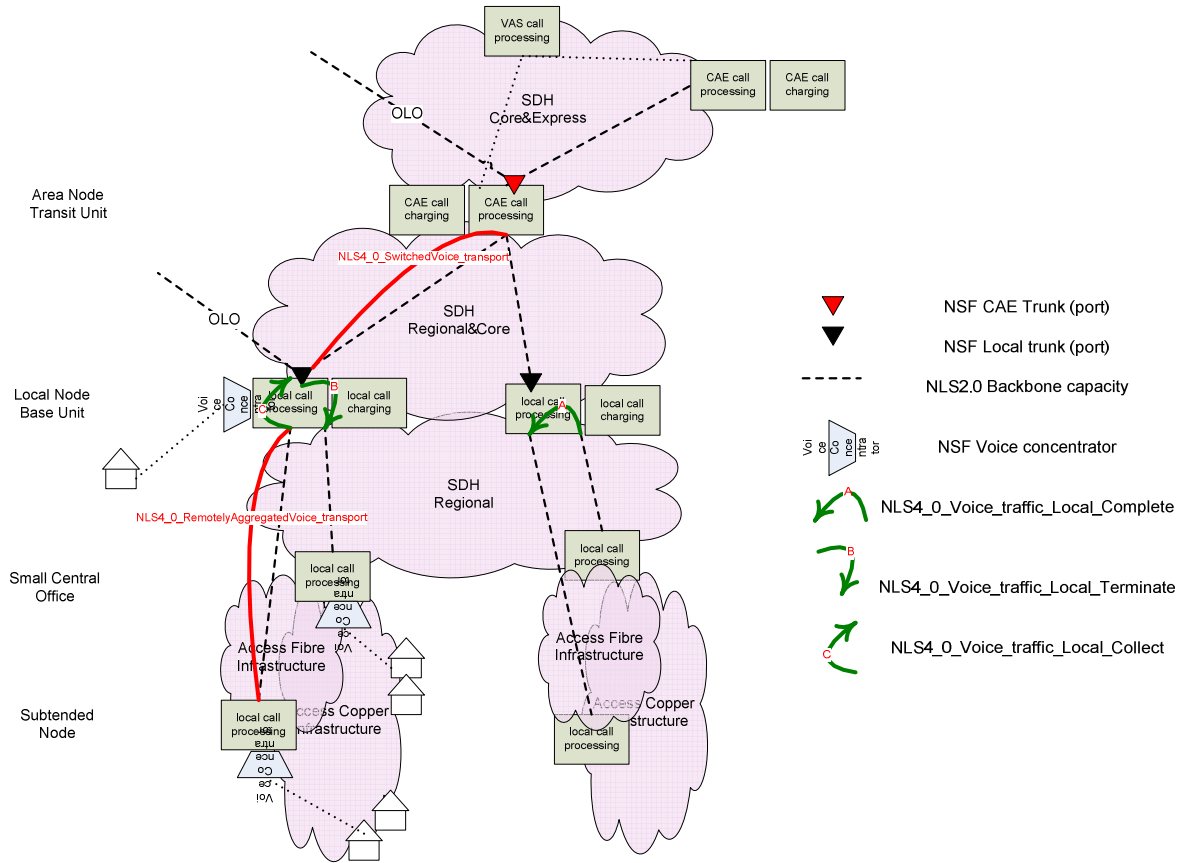


Figure 20 - Switching Network

7.10 Allocation of Network Activities

Activity	Division	Team Group	Driver
[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]	[50_SDE]	SDV-NIE-CAT	Mandays
[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]	[50_SDE]	SDV-NIE-CPE	Mandays
[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]	[50_SDE]	SDV-NIE-DOT	Mandays
[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]	[50_SDE]	SDV-NIE-LAB	Mandays
[5.1.1. NW Infrastructure Engineering (SDV-NIE-xxx)]	[50_SDE]	SDV-NIE-PLE	Mandays
[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]	[50_SDE]	SDV-PSE-DAC	Mandays
[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]	[50_SDE]	SDV-PSE-VID	Mandays
[5.1.2. NW Product & Service Engineering (SDV-PSE-xxx)]	[50_SDE]	SDV-PSE-VNC	Mandays
[5.2.1. NW Plan Backbone Inside plant works and document (IDO-FXx-BND-EQE)]	[50_SDE]	IDO-FXx-BND-EQE	# Equivalent FTE
[5.2.10. NW (Supervision, coordination and inventory) Outside construction (IDO-FXx-LPE-xxx)]	[50_SDE]	IDO-FXx-LPE-xxx	# Equivalent FTE
[5.2.11. NW Access Outside Video event (IDO-FXx-OPT-Radio)]	[50_SDE]	IDO-FXx-OPT-Radio	# Equivalent FTE
[5.2.12. NW Access Outside VHR for customer (IDO-FXx-OPT-VHR)]	[50_SDE]	IDO-FXx-OPT-VHR	# Equivalent FTE

[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]	[50_SDE]	COP-CFO1-CAB	Cable provisioning DUUs
[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]	[50_SDE]	COP-CFO2-CAB	Cable provisioning DUUs
[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]	[50_SDE]	COP-CFO3-CAB	Cable provisioning DUUs
[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]	[50_SDE]	COP-CFO4-CAB	Cable provisioning DUUs
[5.2.13. NW Access Outside - copper work for customer (COP-CFO-Cable)]	[50_SDE]	COP-CFO5-CAB	Cable provisioning DUUs
[5.2.2. NW Plan Access Inside plant works and document (IDO-FXx-BND-EQE)]	[50_SDE]	IDO-FXx-BND-EQE	# Equivalent FTE
[5.2.3. NW Backbone Inside Installation (HW or SW) (IDO-FXx-IMR-xxx)]	[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE
[5.2.5. NW Infrastructure Remote Configuration (SIO-INO-TIO)]	[50_SDE]	SIO-INO-TIO	# Equivalent FTE
[5.2.6. NW Voice Service Remote Configuration (SIO-INO-VSP)]	[50_SDE]	SIO-INO-VSP	# Equivalent FTE
[5.2.7. NW Data&TV&CDR Service Remote Configuration (SIO-INO-DSP)]	[50_SDE]	SIO-INO-DSP	# Equivalent FTE
[5.2.8. NW Plan outside plant works and document (IDO-FXx-BND-IDE)]	[50_SDE]	IDO-FXx-BND-IDE	# Equivalent FTE
[5.2.9. NW Plan outside plant works, Solution design & Engineering for VHR/Industrial zonings (IDO-FXx-BND-IDE-VHR)]	[50_SDE]	IDO-FX3-BND-IDE-VHR	# Equivalent FTE

[5.3.1. NW Backbone Inside Maintenance & Repair (IDO-FXx-IMR-xxx)]	[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE
[5.3.10. NW Infrastructure Maintenance and Remote Repair 3rd line (SIO-INO-TIO)]	[50_SDE]	SIO-INO-TIO	# Equivalent FTE
[5.3.11. NW Infrastructure Monitoring (SIO-CSC-NOC excl. ITMON)]	[50_SDE]	SIO-CSC-NOC_NW	# Equivalent FTE
[5.3.2. NW Access Inside Maintenance & Repair (IDO-FXx-IMR-xxx)]	[50_SDE]	IDO-FXx-IMR-xxx	# Equivalent FTE
[5.3.3. NW (Supervision, coordination and inventory) Outside Maintenance & Repair (IDO-FXx-LPE-xxx)]	[50_SDE]	IDO-FXx-LPE-xxx	# Equivalent FTE
[5.3.4. NW Access Outside Maintenance & Repair FO, ROP (IDO-FXx-OPT-OUT)]	[50_SDE]	IDO-FXx-OPT-OUT	# Equivalent FTE
[5.3.5. NW Access Outside Maintenance & Repair VHR, Radio (IDO-FXx-OPT-VHR, IFO-FXx-OPT-Radio)]	[50_SDE]	IDO-FXx-OPT-Radio	# Equivalent FTE
[5.3.5. NW Access Outside Maintenance & Repair VHR, Radio (IDO-FXx-OPT-VHR, IFO-FXx-OPT-Radio)]	[50_SDE]	IDO-FXx-OPT-VHR	# Equivalent FTE
[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]	[50_SDE]	COP-CFO1-CAB	Cable repair DUs
[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]	[50_SDE]	COP-CFO2-CAB	Cable repair DUs
[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]	[50_SDE]	COP-CFO3-CAB	Cable repair DUs

[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]	[50_SDE]	COP-CFO4-CAB	Cable repair DUs
[5.3.6. NW Access Outside Maintenance & Repair Cable (COP-CFO-Cable)]	[50_SDE]	COP-CFO5-CAB	Cable repair DUs
[5.3.7. NW Customer Service Fault Handling & Remote Repair 2nd line (SIO-CSC-SSD)]	[50_SDE]	SIO-CSC-SSD	# Equivalent FTE
[5.3.8. NW Voice service level Maintenance & Remote Repair 3rd line (SIO-INO-VSP)]	[50_SDE]	SIO-INO-VSP	# Equivalent FTE
[5.3.9. NW Data&TV&CDR service level Maintenance & Remote Repair 3rd line (SIO-INO-DSP)]	[50_SDE]	SIO-INO-DSP	# Equivalent FTE

Cost of NW activities is allocated to NW objects (NE, NSF, CP, NLS) on which teamgroups have worked via assigned NW activity.

- The driver quantity used for SDE SDV teamgroup&activity is Mandays registered in RAPID.
- The driver quantity used for COP CFO CABLE teamgroup&activity is Cable related DUs registered in CLARA.
- The driver quantity used for SDE SIO teamgroup&activity is Equivalent FTEs reported from ABB.
- The driver quantity used for SDE IDO teamgroup&activity is Equivalent FTEs reported from LEAD, JMS and CANVAS.

Allocation is processed in “Network Primary Activities (Process 5)” box (ref to Figure 2: Graphic representation of the Belgacom Regulatory Cost Model 2009) and ending in cost object of module “Network” of REG Cost Model.

8 Annex I: ABC Flow Acronyms

ABC	Activity Based Costing
BIPT	Belgian Institute for Postal services and Telecommunications
BTN	Business TransformatioN
CBU	Consumer Business Unit
CC	Costs Center
CCG	Costs Center Group
CFO	Customer Field Operations
COGS	Costs Of Good Sold
COP	Customer Operations
CP	Costs Pool
CWS	Carrier & WholeSale
EBU	Enterprise Business Unit
FAC	Fully Allocated Costs
HCA	Historical Cost Accounting
IDO	Infrastructure, Deployment & field Operations
MOS	Material Out of Stock
NRA	National Regulatory Authority
REG	(Belgacom) Group Regulatory Affairs
SDE	Service Delivery Engine
SDV	Service Development
SIO	Service center & remote Infrastructure Operations
SMP	Significant Market Power
SOG	Services & Other Goods
S&S	Staff & Support

9 Annex II: Network and IT Flows Acronyms

AC	Asset Class
ADSL	Asymmetric Digital Subscriber Line
ATM	Asynchronous Transfer Mode
BA	Basic Access
BAS	Broadband Access Server
BES	Belgacom European Solutions
BGC	Belgacom
BILAN	Belgacom Interconnection of LANs
BLES	Belgacom LAN Extension Service
BROBA	Belgacom Reference Offer for Bitstream Access
BROTSOLL	Belgacom Reference Offer for Terminating Segment of Leased Line
BVAS	Business Value Added Services
CAE	Coverage Exchange Area
CAPEX	Capital Expenditures
CP	Cost Pool
CPE	Customer Premises Equipment
CPU	Central Processing Unit
CWDM	Coarse Wavelength Division Multiplexing
DACS	Digital Analog Cross-connect System
DCN	Data Communication Network
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DWDM	Dense Wavelength Division Multiplexing
EAA	Extra Access Area
EAL	Ethernet Access Line
EFM	Ethernet First Mile
ESS	Ethernet Service Switch
Ethane	ETHernet Aggregation NETwork
EUS	End User Service
FAC	Fully Allocated Costs

FIFA	Fast Internet Future Architecture
FTTC	Fiber To The Cabinet
FTTO	Fiber To The Office
Gb	Giga bit
Gbps	Giga bits per second
HW	HardWare
IAA	Intra Access Area
iDTV	interactive Digital TeleVision
IN	Intelligent Network
INCA	Integrated Cost Application
IO	In/Out
IP	Internet Protocol
IPVPN	Internet Protocol Virtual Private Network
ISAM	IP Subscriber Line Access Multiplexer
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LDC	Local Distribution Center
LEX	Local Exchange
LL	Leased Line
LTE	Line Terminating Equipment
Mbit	Mega bit
MOLO	Mobile Other Licensed Operator
MPLS	MultiProtocol Label Switching
MSR	Multi Server Router
MUX	Multiplexer
MVAS	Mass Value Added Services
MWE	MicroWave Equipment
NE	Network Element
NGA	New Generation Access
NGN	New Generation Network
NLS	Network Layer Service
NTE	Network Terminating Equipment
NTP	Network Termination Point
NSF	Network Stage Function

OLO	Other Licensed Operator
OLTE	Optical Line Terminating Equipment
OPEX	Operational Expenditure
OVH	Overhead
PDH	Plesiochronous Digital Hierarchy
PRA	Primary Access
PSTN	Public Switched Telephony Network
QoS	Quality of Service
RAM	Random Access Memory
ROP	Remote Optical Platform
SDH	Synchronous Digital Hierarchy
SDSL	Symmetric Digital Subscriber Line
STM	Synchronous Transport Module
TDM	Time Division Multiplexing
TV	TeleVision
VAS	Value Added Services
VDSL	Very high speed Digital Subscriber Line
VLAN	Virtual Local Area Network
VoD	Video on Demand
VoIP	Voice over Internet Protocol
VP	Virtual Path
VPLS	Virtual Private Local area network Service
VPN	Virtual Private Network
WDM	Wavelength Division Multiplexing