

# **Belgacom**

## **Network transformation outlook 2009-2014**

For Information to the Belgian Institute for Postal  
and Telecommunications

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## **1. Background and Scope of the present document**

This document has been elaborated to answer the request for information of the BIPT as formulated in the decision of 12 November 2008 concerning "De impact van NGN en NGA op de breedbandtoegangsmarkten".

The present document has been constituted to Belgacom's best knowledge at present of the future evolutions of its networks taken into account that several matters discussed in the present document are not covered by detailed or final decisions of the management and/or Board of Directors of Belgacom.

The present document contains the relevant information to what transformations in Belgacom's network will take place in the coming 5 years that will or might have an impact on the existing wholesale services and wholesale access points.

Most statements in the present document constitute forward-looking statements. These statements may include, without limitation, statements concerning future technological evolutions, decisions and timelines, and statements preceded by, followed by or including the words "believes", "expects", "anticipates" or similar expressions. These forward-looking statements rely on a number of assumptions concerning future events and evolutions and are subject to uncertainties and other factors, many of which are outside our control that could cause actual evolutions to differ materially from such statements.

Data and information in the present document may be subject to re-evaluation, evolution and changes.

Belgacom can not guarantee that this information is complete or that no new information will become available with an impact in the coming 5 years.

Belgacom can not be held liable for any mistake, omission or any other short coming of the present information, which has been provided based on our best knowledge and in good faith.

This document doesn't constitute any binding offer from Belgacom and doesn't contain any commitment from Belgacom.

This document and the information within is made independently of any form of appeal, present or future, against a decision or a regulatory requirement imposed to Belgacom related to NGA/NGN.

## 2. The Belgacom Move to All IP Programme

Belgacom's Move to All IP Programme, in this document referred to as "MAIP", aims at adapting and transforming Belgacom's network to the global technological evolution:

- Evolution of Fixed Voice network and Service Platform (VoIP, SDP)
- Migration of transport technologies (ATM/SDH, Ethernet, Mobile Backhaul)
- Anticipate the end of life of multiple legacy technologies in the transport layer
- Invest in network simplification to reduce OPEX and increase operational efficiency

The MaIP network transformation process is expected to be carried out in two phases:

- the first phase, concerns the building of an IP-based network (Broadway+ETHANE) and the porting/implementation of the complete Belgacom product portfolio (retail/wholesale) on the new infrastructure.
- In the second phase, the legacy network technologies will be subject to consolidation and phasing out in view of optimizing the network infrastructure and deal with the fact that legacy technology has become obsolete and without vendor support.

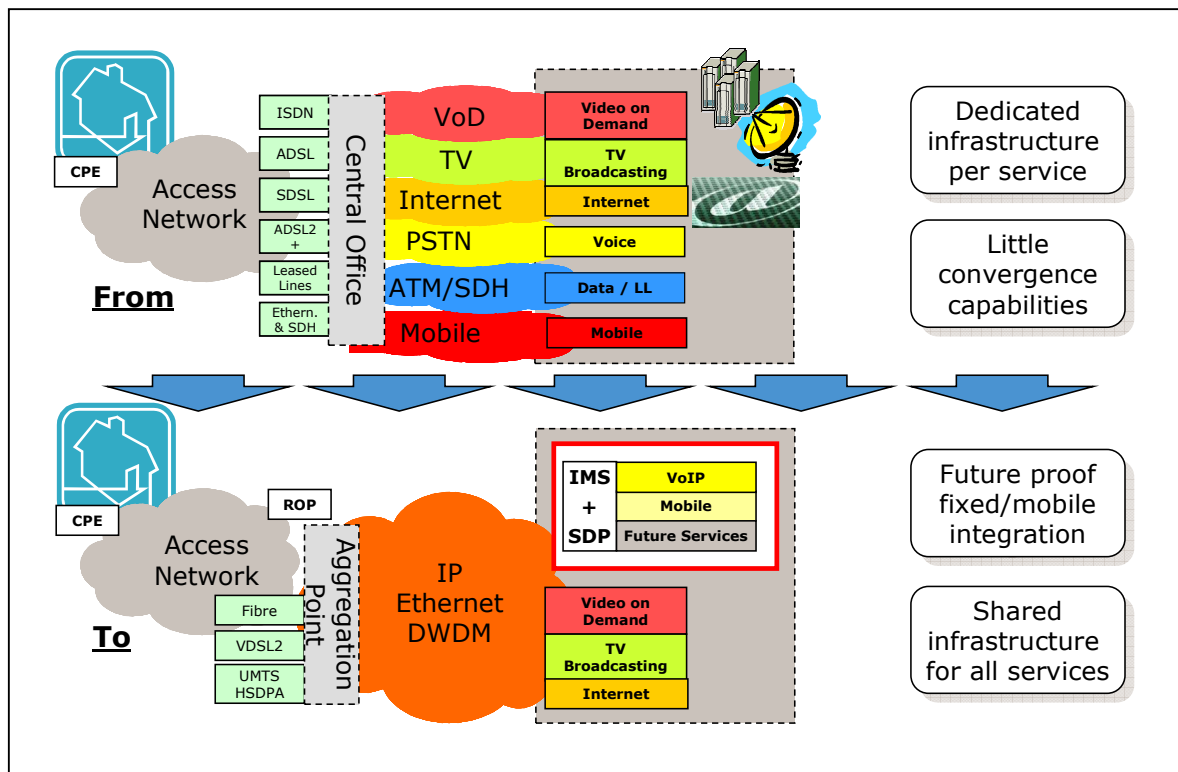
**The first phase** has been divided into three steps:

- Deployment of an IP-based access infrastructure based on FTTC and VDSL2 (the 'Broadway' project)
- Deployment of an IP-based aggregation and core network (Ethernet and DWDM). The deployed IP-based aggregation/core network supports high bandwidths and provides the reliability needed for future proof services (the 'Ethane' and 'Neon' projects)
- Porting of the complete Belgacom service portfolio on the IP network. This entails both the retail and the wholesale portfolio of Belgacom.

In line with our present expectations **the second phase** will include all initiatives aimed at consolidating the customer installed base on the IP infrastructure and at reducing the operational complexity of managing several network infrastructures in parallel (one per service).

- IMS Introduction
- Phasing out of access legacy technologies (Leased Lines in all different flavors, X.25, PDH) and traffic transition to IP-based infrastructure
- Phasing out of core legacy technologies (ATM, SDH, PSTN) and traffic transition to IP-based infrastructure

Fig. 1 below gives a schematic overview of the expected network simplification:



**Figure 1: Network Simplification**

The MAIP programme will have an impact on the Wholesale services currently offered by Belgacom. Below we enumerate the most important expected impacts:

- **Broadband Access services:** The current ATM based BROBA services will need to be transformed in order to meet the global technological evolution towards Ethernet. We anticipate that in the short term:

- Vendor support for ATM will vanish (maintenance issues)
- Saturations on ATM networks possible

Therefore the ATM technology in the Belgacom network will be out phased and the current ATM-based BROBA services will migrate towards similar services based on Ethernet. According to the planning ATM is to be phased out by 2012 and Ethernet as uniform medium for access technologies such as ADSL, ADSL2+, VDSL2

- **Data and Capacity services:** migration from BILAN and Leased Lines to Ethernet based services.
- **Voice Interconnect:** as the complete voice network will migrate to an IMS based infrastructure, the current interconnection between Belgacom and third party operators will evolve to an IP Interconnect model.
- **Local Loop Unbundling services:** as a number of LEX buildings will be closed, the co-location and services delivered in and from these buildings will have to be terminated and/or migrated to an alternative offer.

### **3. Broadband Access Evolution**

Belgacom is deploying Fibre-to-the-Curb in selected areas (referred to as "Broadway" areas), allowing to offer VDSL2 services which will gradually replace the ADSL and ADSL2+ connectivity in those areas.

The impact of this evolution on wholesale access services is twofold:

1. the current unbundling model will evolve to a Sub Loop Unbundling model;
2. the current BROBA offer will evolve to
  - a. on the one hand a wholesale broadband access service (WBA) for VDSL2 connectivity in Broadway areas;
  - b. a BROBA Ethernet service for ADSL(2+) connectivity in non-Broadway areas on the other hand.

#### **3.1 Broadway**

Belgacom announced its Broadway plans publicly in 2004 with an initial target coverage for VDSL2 of 46%. This coverage target was later increased to 61%. The current target is set at coverage 80% by mid 2011. At the end of H1 2009 Belgacom reached an effective coverage for VDSL2 of 70%.

The coverage as well as the attainable speeds with VDSL2 depend on the attenuation. Our present knowledge limits the reachable attenuation for VDSL2 to 1dB / 20 Mbps.

Besides, the implementation of the 998AE17 band plan introducing 17MHz frequencies in VDSL2 technology is foreseen in 2010.

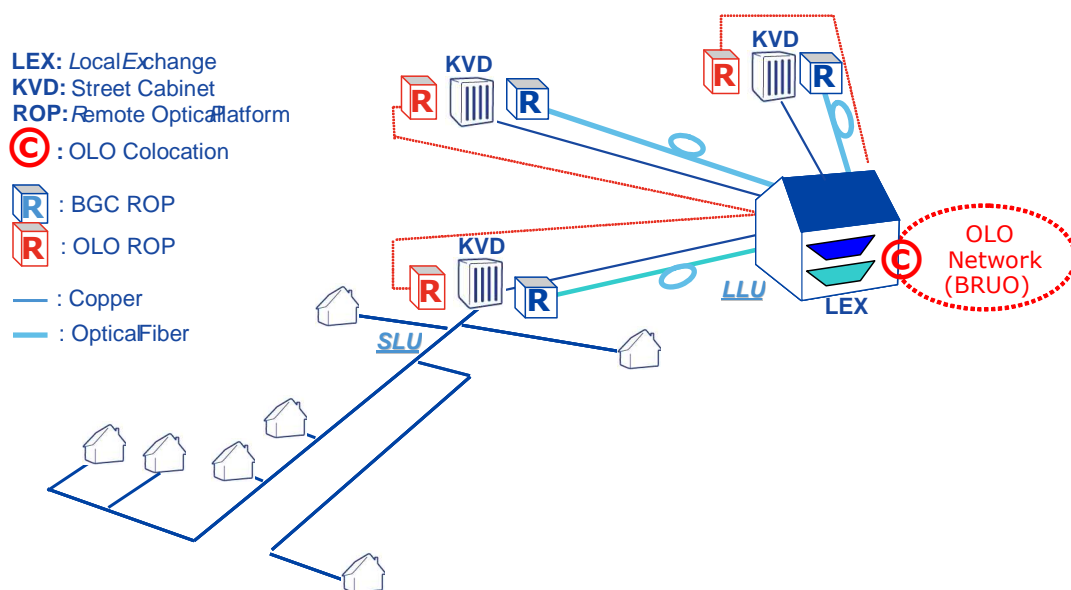
The roll-out is targeted towards a coverage percentage, and in order to achieve this infrastructure works are conducted in several regions in parallel. The exact deployment depends on the progress of these works and timing required to obtain the necessary permits. Information on a more detailed basis regarding availability is provided if, where and to the extent relevant in the context of the existing wholesale access services.

#### **3.2 From LLU to SLU**

As Belgacom is investing and deploying a fibre network to the vicinity of the Street Cabinet (KVD), by installing Remote Optical Platform units (ROP) next to those Street Cabinets, the MDF functionality in the Local Exchange (LEX) will disappear.

Therefore, as part of its roll-out, Belgacom expects to be able to dismantle a number of the local exchange buildings. Hence the current co-location and unbundling services at the LEX will be terminated, pursuant to the regulatory framework as defined in the relevant regulated reference offers and the respective contracts.

The figure below gives an overview of the most important elements in the new access network, as well as the respective elements.



**Figure 2: From LLU to SLU**

### 3.3 Wholesale Broadband VDSL2

The Wholesale Bitstream Access (WBA) VDSL2 service will allow the OLO to connect onto the Belgacom network at a Belgacom Service PoP and to receive any Ethernet cell from the End User using VDSL2 technology. The transport end-to-end between the end-user and the beneficiary is Ethernet.

The offering of the service covers:

- The provisioning by Belgacom of one or several OLO Access Lines between the equipments of the beneficiary and the Belgacom Service PoPs;

- The provision by Belgacom of bandwidth (VLANs) between the IP-DSLAMs in which the beneficiary wants to connect end-users and the Belgacom Service PoPs to which the equipments of the beneficiary are connected;
- The provision and the configuration by Belgacom of Ethernet Transport between the IP-DSLAMs and the equipments of the beneficiary.
- The provision by Belgacom of VDSL2 lines to the end-user.

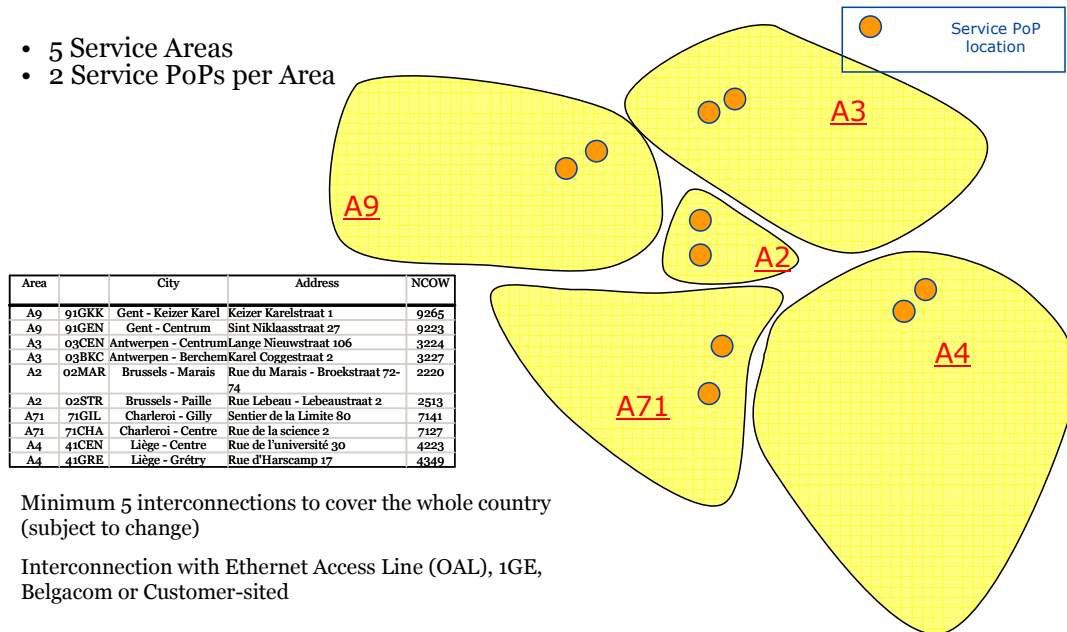
Four service qualities are offered for the WBA VDSL2 service, differentiated by the Ethernet p-bit (P):

- P=0: best effort.
- P=1: low priority.
- P=3: medium priority.
- P=5: highest priority.

Per service quality and per LEX, the Virtual LANs (VLANs) of the end-user lines of an OLO are aggregated and transported in 1 VLAN to a Service PoP where an Access Line of the OLO is connected (this VLAN could be indicated as a Shared VLAN).

This Service PoP is located in a Service Area, there are 5 Service Areas for the whole of Belgium, each of them covering 1 geographical area. Per Service Area there are 2 Service PoPs, located in 2 different buildings.

- 5 Service Areas
- 2 Service PoPs per Area



**Figure 3: Service Areas**

As a summary, the following elements are part of the current WBA offer available from Belgacom:

- 10 Access Points
- Ethernet Access Line
- 4 service qualities
- Shared and dedicated VLAN option
- Speed: 20 Mb Down, 2 Mb Up
- Installation mode: Telecom & DIY
- Specific Sagem modem needed
- Specific NTP
- Internal cabling rules
- Direct pairs

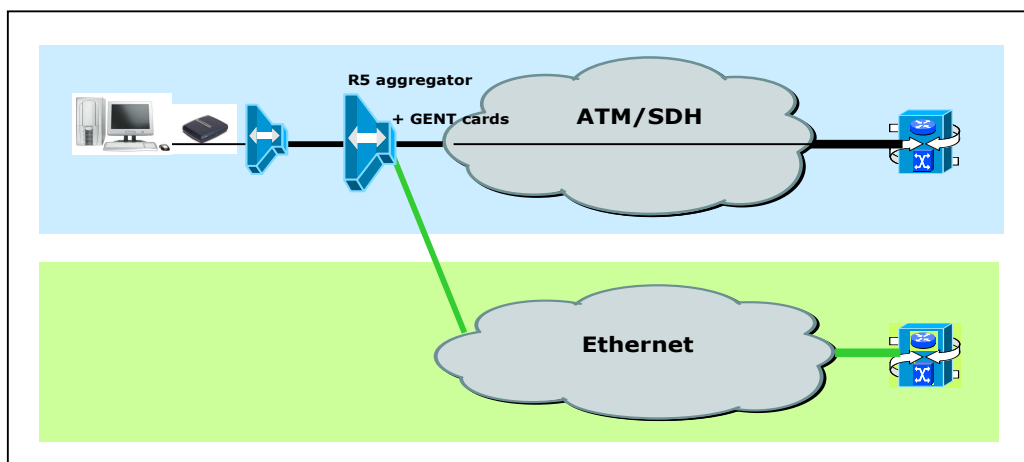
A service for dedicated VLAN's has been developed and is under further discussion with the sector and the NRA's. The offer is available to the market since end of June 2009. These offers have been subject to a decision by BIPT of 30 September 2009 and will be adapted accordingly.

### 3.4 **ATM Outphasing**

At the transport network level, Belgacom's objective is to consolidate the traffic on a common IP based infrastructure. Several elements justify this evolution:

- Continued traffic growth will trigger new expensive investment. It should be avoided to invest in obsolete technology.
- Maintenance contract costs for legacy technology increase.
- Due to the aging equipment failures increase and risk for need of equipment renewal increases.

Hence ATM outphasing is the most cost-effective path for the future. This is in line with the global technology trends and the present and future strategy of all telco equipment vendors.



#### **Figure 4: ATM Outphasing**

Belgacom anticipates to adopt the following strategy to accomplish this technological transformation:

- Alcatel R5 Gigabit Ethernet NT cards installed in R5 DSLAM as of 2009
- DSL traffic can be mapped from ATM to Ethernet backbone
- Extension of BROBA ADSL(2+) to Ethernet transport
- Outphase progressively the ATM backbone between 2010 and 2012

The Wholesale interconnection points on ATM level will be closed and replaced by the 10 Ethernet Service Nodes; detailed timing to be specified.

A specific task group with Belgacom and OLO representatives has been composed to discuss the technical and practical elements of the "Broba on Ethernet" offer.

All meeting minutes of the workshops and documents regarding this offer are available for public consultation at the Belgacom website:

[http://www.belgacom.be/wholesale/en/jsp/dynamic/product.jsp?dcrName=nws\\_network\\_evolution](http://www.belgacom.be/wholesale/en/jsp/dynamic/product.jsp?dcrName=nws_network_evolution)

The Broba on Ethernet offer with Shared VLAN is scheduled for release in March 2010. The version with Dedicated VLAN is expected to follow shortly after.

#### **4. Data and Capacity Services**

MPLS Ethernet provides a future proof solution for cost-effective bandwidth for both mobile and fixed operators.

BILAN ATM services will migrate to MPLS Ethernet between 2009 and 2012.

BILAN VPN services will be out phased by end 2015.

With respect to the Mobile Backhaul, which is the transport technology used to connect base stations in a mobile network to the 1st level mobile aggregation nodes (Base Station Controllers for 2G and Radio Node Controllers for 3G), currently the following technologies are being used:

- Digital leased lines for 2G
- ATM (over leased lines) for 3G

The use of Leased Lines is however not a future proof solution:

- Bandwidth demand is ever increasing and would require multiple Leased Lines to be installed. In the foreseeable future the number of required Leased Lines will surpass the number of provisioned leased lines in the copper network, requiring significant investments in the copper network;
- Further evolutions within the 3GPP standards family require native Ethernet transport.

Therefore a migration to an Ethernet based solution for mobile backhauling is required, bringing the following benefits:

- Future-proof in terms of compliancy to standards evolution;
- Intrinsic aggregation of multiple traffic streams (2G and 3G) over the same infrastructure.

At present it is expected that the following planning will be met:

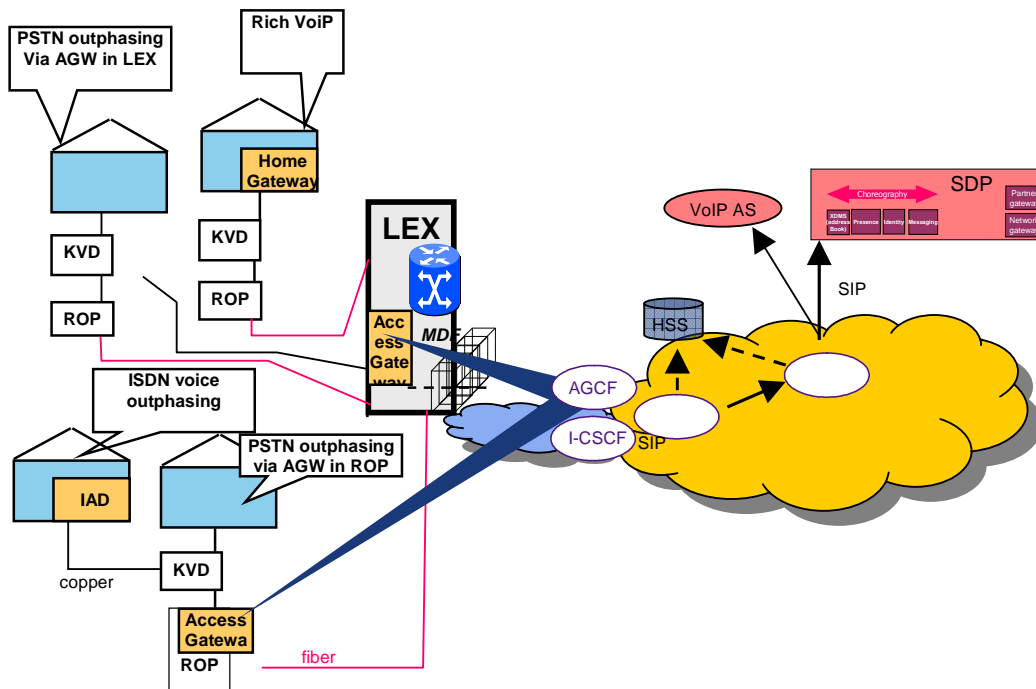
- migration of all BiLAN ATM services completed by end 2012 and BiLAN VPN services by end 2015;
- migration of Leased Lines & related capacity services completed by end 2015.

## 5. Voice Interconnect Evolution

The complete Belgacom voice network will migrate to an IMS (IP multimedia subsystem).

The strategy for this migration is based on the following elements:

- PSTN via Access GateWay as replacement for traditional PSTN services.
- ISDN simulation



**Figure 5: IMS Platform Architecture**

The current voice network is a 2-layer network with 188 Local Exchanges (LEX) and 16 Covering Area Exchanges (CAE). The 16 CAEs are grouped in 8 pairs, each covering a geographical area. Each LEX is connected with the 2 CAEs of the own covering area (some also have trunks with CAEs in another area). The current voice network consists of EWSD & S12 switches (as well CAE as LEX). The voice customers (ISDN & PSTN) are connected to a LEX in their area.

This network is scheduled to be gradually outphased and replaced by an IMS (IP Multimedia) solution.

This evolution will likely have an impact on the current interconnect models, since the entire PSTN network must be outphased by end 2015. Belgacom has started discussions on technical and practical aspects with the market and the regulator, and will develop a new BRIO-IP Interconnect model in the course of 2010. The launch of this offer is anticipated for 2011.

The detailed content of the offer and timing will depend on factors such as the overall IMS roll-out planning, regulatory discussions and technological choices still to be made.

## 6. Building Outphasing

The Belgacom Move to All IP Programme is an essential enabler for Building Out-phasing.

Currently 65 buildings are identified for closure. Notifications have been sent for the outphasing of these buildings, which will be scheduled between 2013 and 2018.

Impact on co-location and LLU services:

- In principle the MDF and feeding network are outphased completely
- In certain cases a limited MDF function might be kept, but only to serve a limited number of distribution pairs (i.e. distribution directly connected to LEX or KVD's - if any - that are out of the VDSL scope).
- In principle and in general the copper feeding network of the local net will thus be outphased.
- In all cases the buildings will need to be freed completely.

Detailed communication, including the list of buildings and the impacted BROBA and BRUO circuits, has been sent to the BIPT and the market. Belgacom will confirm and notify each building individually 5 years before effective closure.

Planning as from 2015 is under reserve. The below planning is an update of a previous version communicated to the market.

1	02BER/02DIL	23	03SIL	45	55RON
2	02BOS	24	03WES	46	56KOR
3	02BRC	25	03ZUI	47	57IEP
4	02CEN	26	03ZWY	48	59GIS
5	02DRO/02FOR	27	10COU	49	59OOS
6	02EUR	28	10LIM	50	64LAL
7	02GRI	29	11HAS	51	65MON
8	02HAL	30	11HSW	52	67NIV
9	02HOE	31	11HSZ	53	68ATH
10	02LIN	32	11NER	54	80STA
11	02MUT/02NOH	33	13DIE	55	81MAH
12	02OBS	34	14HER	56	81NAM
13	02SAC	35	15PUT	57	83CIN
14	02VIL	36	41CHE	58	87EUP
15	02WEZ	37	41HER	59	87SPA
16	03BER	38	50ASS	60	87VER
17	03BOE	39	50MIC	61	89BRE
18	03BRM	40	51ROE	62	89GKZ
19	03CEN	41	52DEN	63	91GKK
20	03DEU	42	52HAM	64	91WAC
21	03ESS	43	53LED	65	91WON
22	03KAL	44	54NIN		
	2013	2014	2015	2016-2018	

A first batch of 4 buildings subject to outphasing for 2013 (02BRC; 02EUR; 03WES and 83CIN) has been notified in the course of 2008.

Pursuant the decision of 12 November 2008 regarding NGN/NGA all future MDF closures will be notified each building individually 5 years before effective closure.

