FTTH Innovation Awards Compendium 2010

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Fibre to the Home Council Europe

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Foreword

In today's challenging business environment it is more important than ever to nurture new ideas. With this in mind, the FTTH Council Europe launched the first ever FTTH Innovation Awards, which are given to reward innovative companies, universities and other organisations in the fibre-to-the-home ecosystem.

Submissions were sought in three categories: marketing and business; deployment and operations; and technical and technology. The entries were judged by an independent panel of analyst experts in a blind selection process. More than 40 entries were received across the three categories.

The winner in each category received prize money and a crystal trophy in an awards ceremony that took place on 25 February 2010 at the FTTH Conference in Lisbon, Portugal.

The Council was positively surprised by the high number of entries, particularly since this was the first time that the award had been organised. As there were several interesting submissions, it was decided that we should share the information more widely. We asked the five shortlisted finalists from each category for permission to publish their Innovation Award submissions, and permission was received from all but two finalists. The Compendium you are now reading is the result. The winner appears first in each category; the remaining entries are listed alphabetically.

On behalf of everyone at the FTTH Council Europe, I extend my warmest thanks to the talented people at these organisations for sharing their ideas. Please also join me in congratulating the winners.

Hartwig Tauber, Director General of the FTTH Council Europe

Category: Marketing and Business

Open High Speed Broadband Content and Service Experimental Platform

Public funders Europe (ERDF), French Ministry of the Economy (DGCIS), DRIRE, Caisse des Dépôts, Ile-de-France Region, City of Paris, Seine-Saint-Denis Department, Yvelines Department	
Partners Cap Digital, Bearstech, FaberNovel, Institut Telecom, Telecom Paris Tech, AFNIC, MSH Paris-Nord, Université Paris 13, Orange Labs, Centre Pompidou, IRI, Cité des Sciences et de l'Industrie, Groupement Cartes Bancaires **Service providers** Tecdev, Silicon Sentier, Ad Valem, Médiamétrie **Experimentation project leaders** Orange, Maxicours, E-Pli, VirtualDive, Chugulu Games, Metaboli, IRI, Univers Ciné, Sony CSL, Fair Play Interactive, Mondomix, Voxler, Jamespot, Navidis, Sciences & Co, Tivipro, Studio Broceliande, Star Apic, Ubicast, Erdenet, Nomao, Voddnet, 3D2+, ISI, Remu, IPCiné, IDAaas	
General presentation of the platform Tecdev - release of 30/12/2009 - THD_DossierPrésentation 100121 EN	

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The THD Platform: an Open High Speed Broadband Digital Services and Contents Experimental Platform

A Large-Scale Structuring Project in the Greater Paris Region

The “Très Haut Débit” (THD) or High Speed Broadband experimentation platform gathers resources and technical means **to help businesses prototype and develop their innovative digital services and contents on optical-fibre high speed broadband networks**. It is also a pole for monitoring strategies of industrialists involved in the FTTH network value chain and an emerging digital usage observatory.

The THD Platform gathers a dozen of public and private partners around the Cap Digital Paris Region Competitiveness Cluster and hosts FTTH network on-line service and digital content experimentation projects.

Cap 2012 – A new strategy for the digital sector in France

The THD Platform’s cooperative project was selected by the Ministry for Industry in the 5th call for research and development proposals of Competitiveness Clusters. The announcement was made by the Prime Minister, François Fillon, on February 21st, 2008, at the Cap 2012 event where the Cap Digital Paris Region Competitiveness Cluster’s 2008-2012 strategic plan was presented.

The THD Platform is supported by the European Regional Development Fund (ERDF), by the French state via the Single Inter-Ministry Fund (FUI) that supports Competitiveness Clusters research and development projects coordinated by the General Directorate for Competitiveness, Industry and Services (DGCIS) that is part of the Ministry for Industry, and via the Regional Directorate for Industry, Research and Environment (DRIRE Ile-de-France), by the Caisse des Dépôts, by several local communities, by the Ile-de-France Region and by Paris, Seine-Saint-Denis and Yvelines Departments. Oséo, a public body that supports technological innovation and SMEs’ growth, is also a partner of the THD Platform.

The THD Platform benefited from an amount of public funds of M€6.3 out of a total 3-year (2008-2010) M€9 investment and operation budget.

Broadband content and service projects that were experimented on the Platform are co-funded by Oséo.

Moreover, the THD experimentation Platform lies at the heart of the **Ile-de-France Region Living Lab**, a Cap Digital Competitiveness Cluster’s “usage laboratory”, which was granted the European label “Living Labs” in November 2008 by the European Netwok of Living Labs (ENoLL).

Member of European Network of Living Labs

The THD Platform is steered by the Cap Digital Competitiveness Cluster (assistant to the operational coordination: Tecdev). Such involvement of the Competitiveness Cluster in a cooperative R&D project, the first of its kind, shows how important technical, economic and social challenges of new FTTH network digital services and contents are considered by the cluster.

Cap Digital, the Digital Content and Service Competitiveness Cluster

France launched a new industrial policy on Competitiveness Clusters by associating, region-wide, businesses, research centres and training institutes involved in a partnership-based approach around innovating industrial projects targeted at new markets and creating jobs. The Cap Digital Paris Region Competitiveness Cluster is a pole for the Greater Paris Region digital services and contents.

Cap Digital gathers more than 500 members – **430 SMEs, 20 major groups, 50 universities and Grandes Ecoles**, which gather **170 research laboratories**. Cluster players belong to 9 domain communities: Digital Education and Training; Knowledge Engineering; Culture, Press, Media; Image, Sound and Interactivity; Mobile Services and Usages; Robotics and Communicating Objects; Digital Design; Free Software, Cooperation and New Models.

The Competitiveness Cluster's objectives are to make the Greater Region one of worldwide digital references from both industrial and strategic points of view. R&D development, Cap Digital member businesses' growth and Cap Digital member networking and international promotion are all missions that the cluster has set for itself to support creativity and competitiveness of this industrial sector that represents, by itself, a 300-billion-Euro market.

Since the creation of the Competitiveness Cluster in 2006, the latter received 770 projects in total, out of which more than 343 were granted its label. 248 of them got funds for a total budget of 515 million Euros, out of which more than 222 million Euros in aid.

The Secretary of State for Prospective and Development of Digital Economy, Nathalie Kosciusko Moriset, visits **the THD Platform demonstrator** in the City of Sciences and Industry in June 2009.

12 public and private partners gathered to address high speed broadband network content and service related challenges

Objectives and Structuring of the THD Platform

The main objectives of the Regional THD Experimentation Platform are:

- **Accelerate prototyping and industrialisation of high speed broadband innovative on-line services** by carrying out **real-size experiments** and by beta testing services;
- **Build upon usage observations** within the framework of high speed broadband experiments, towards setting up an **observatory of digital services, contents and practices** in the Greater Paris Region.

Four functional components make up the structure of the THD Platform:

1) **A resource cluster** (data centre) for hosting digital services and contents and a technical and scientific assistance scheme for developing experimentation projects and individually evaluating experimentations; the latter was set up by several cluster partners, among which the University of Paris 13, Bearstech, the Institut Télécom and Télécom Paris Tech.

   The resource cluster includes a strategic monitoring pole meant to provide Cap Digital players and, more generally, all digital content sector businesses with an insight of telecommunication networks evolution

perspectives, of Internet services and of digital service and content production and diffusion value chain, in particular on HSBB networks. Strategic monitoring in relation with new social and cultural practices is carried out by the Maison des Sciences de l'Homme - Paris Nord, the AFNIC, the University of Paris 13 and the Pompidou Centre's IRI. High speed broadband network usage studies are carried out by Télécom Paris Tech and Orange Labs.

2) **Experimentation projects** lead by businesses based in the Ile-de-France Region that may have to do with on-line services or new types of digital contents allowed by Fiber Broadbad networks; 25 projects are currently hosted by the platform.

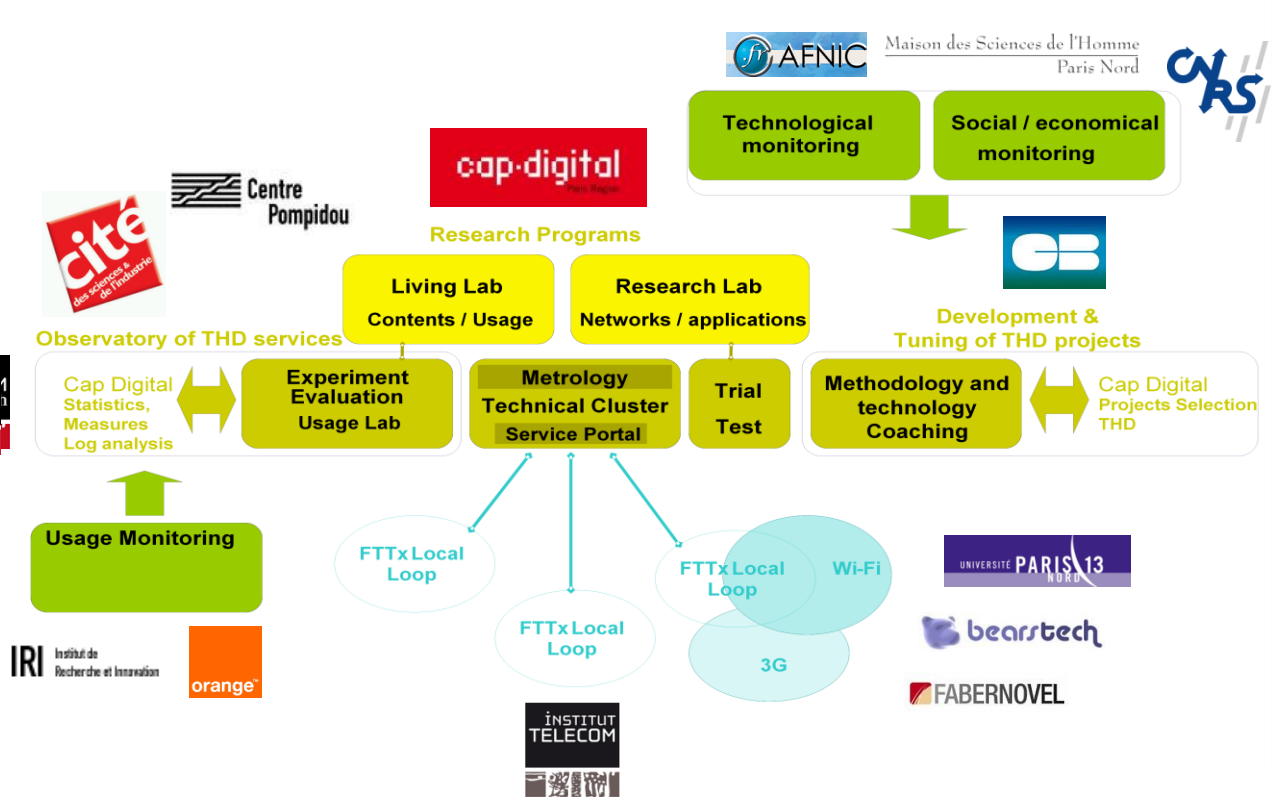
3) **An FTTH optical-fiber experimentation panel** composed of **2,300 households** from the Ile-de-France Region, selected by the Institut Télécom to represent a wide range of publics. The panel is recruited by Médiamétrie.

4) **A platform coordination and moderation scheme**, the Cap Digital cluster being assisted by Tecdev, a firm that specialises in the elaboration and coordination of technological projects. Silicon Sentier is in charge of moderating the portailthd.fr website.

THD Platform Resources

Scientific and Expertise Resources

- Observation of usages and evaluation of practices (Institut Télécom, Telecom Paris Tech, Orange Labs)
- Technological, social, economic and cultural monitoring and prospective analysis (AFNIC, University of Paris 13, Maison des Sciences de l'Homme Paris Nord, IRI, Groupement des Cartes Bancaires)
- Support to experimentation projects lead by businesses (University of Paris 13, Bearstech, Institut Télécom, Télécom Paris Tech)
- Valorisation of projects experimented by businesses (Pompidou Centre, City of Sciences and Industry)



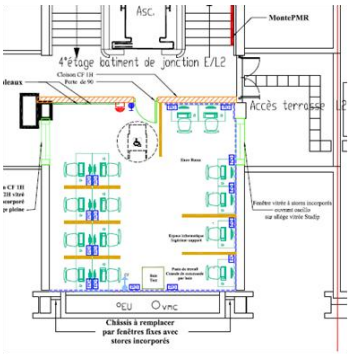
Technical means

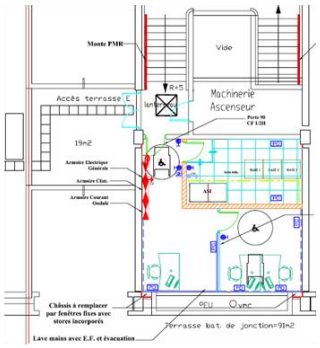
A test bed, i.e. an experimental technical board for the development of new digital contents.

This 100-m2 test bed is located at the University of Paris 13, on the university campus (93).









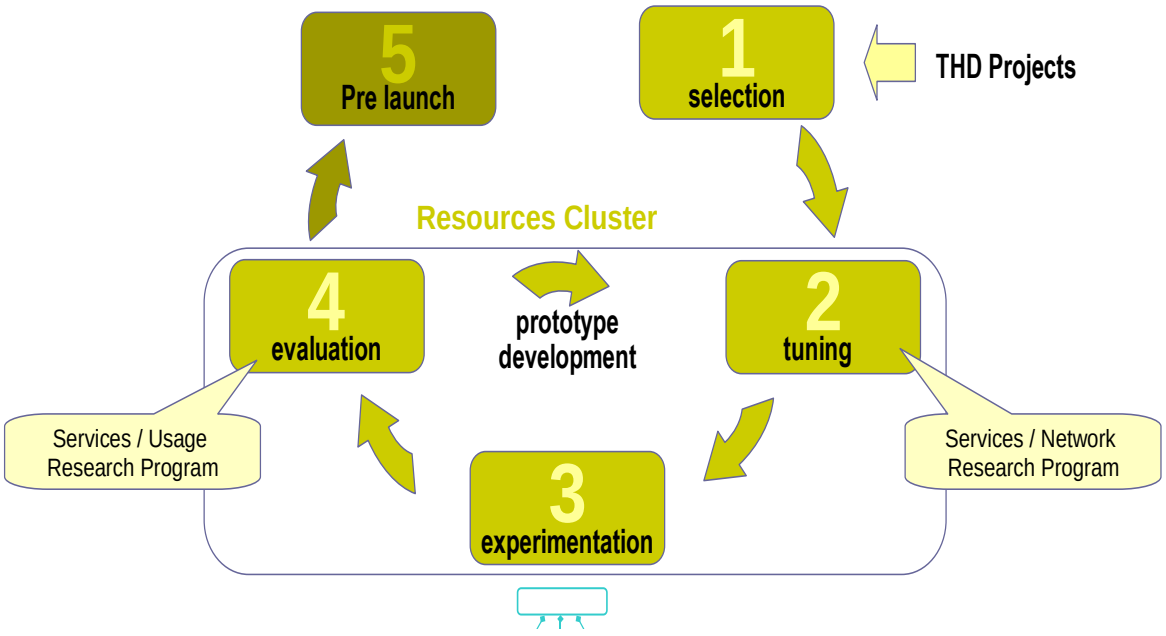
A **technical operational board**, i.e. a data centre for hosting services and contents (hosted by AdValem), characterised by:

- dedicated material (active equipments, vlan and servers)
- an Internet connexion via the AdValem multioperator output: 500 or 1000 dedicated Mbps with scalable peak cell rates
- a possible direct optical-fiber connexion to telecommunication operator transport networks: 2 optical-fiber access points
- servers (double quad core processors, up to 8 G Ram, 600 G HDD) and possible streaming, transfer/storage of high volumes, etc.
- technical means for metrology



Developing Prototypes on the THD Platform

Businesses involved in an experimentation project, once selected, have access to all Platform resources (test bed, hosting, usage evaluation schemes), to experimentation panels, to a methodological and technical assistance and to public co-funding, which may be allocated to all prototype development phases.



Digital on-line service and content development experimentation cycle:

1) **Project selection process** via specific call for proposals organised by Cap Digital and Oséo. A pre-selection of projects lead by businesses is carried out by experts and industrialists gathered in the cluster's technical commissions, in particular in the "Services and Usages" Commission.

2) **Development** of experimentation projects with the installation of prototypes on the test bed followed by their integration to the service portal (www.portailthd.fr).

3) **Experimentation** with the integration of the on-line content or service to the technical board (data centre) under the responsibility of the Platform's scientific partners and implementation of measures via the www.portailthd.fr. portal.The portal allows accessing the THD Platform's various ongoing experimentations. This unique entry point integrating metrology tools allows carrying out a quantitative monitoring of service usages and setting up study panels for each experimentation.

4) **Usage evaluation** through quantitative and qualitative analyses carried out by resource cluster's partners on the technical board supplemented by qualitative surveys with experimentation panels. The evaluation may lead to a complete project revamping or to improvements in terms of ergonomics or service design.

5) Assistance to **communication** on on-line content or service project before the industrial launching phase.

Innovative High Speed Broadband Services and Contents

17 high speed broadband (HSBB) services and content projects lead by innovating SMEs were being experimented at the end of 2009 on the "THD" ("Très Haut Débit" or High Speed Broadband) Platform. A dozen of new projects are expected at the beginning of 2010.

These high speed broadband services and contents cover a wide range of services:

- **Remote teaching**, with the **Cyberclasse** service that was experimented by Maxicours, a company that specialises in school assistance through collective on-line interactive video and shared teaching resources.

- **On-line video games** with services such as **Chugulu Pong**, based on the famous Pong game embellished with a new design, new features, a 4-player mode and a gameplay optimised by high speed broadband network performances, i.e. in particular in terms of response time; or the project of an immersive video game download interface lead by Metaboli.

- **Serious Games** with the **TI THD** service experimented by Navidis, which proposes a new way of learning geography and history of a territory in an immersive 3D universe, or **Digital Ocean** by VirtualDive on the sharing of photos and videos geo-localised in 3D in deep-sea diving spots.

- **Video** with various experimentations such as **Ubicast Forumedia** by Ubicast, which proposes to outsource the creation and sharing of video captions; or the **Pic2clip** service of Tivipro, which proposes professionals (e.g. real estate agencies) and the general public an automated video production service using photos, texts, logos, and configurable scenarios.

- **Videotelephony**, with the **VisioHD** project lead by the Orange operator, which relies on FTTH network rate and symmetry capacities to propose a high-definition videotelephony service.

- **Music** with the **Karaoké 2.0** project proposed by Voxler and Pictomusic with an on-line interactive service with community scoring and application technologies for organising virtual events and live karaoke contests for example.

- **3D**, with the Brocéliande Studio, which has been testing, on the THD Platform, the **Messann** service of assisted creation and of community sharing of moderation clips with 3D characters, or the 3D demonstrator of the **Terra Numerica** project carried out by Star-Apic, the leader of GIS in France, which presents new on-line interactive services based on a realistic digital 3D mock-up of Paris. Major players such as Thales Services or the Institut Géographique National intervene on this 3D service project.

- Collaborative applications on **social networks**, around applications of the Wikipedia type such as **HD Sciences**, participative audiovisual encyclopaedia in the fields of sciences and techniques proposed by Sciences & Co; or **JamesPill's** by Jamespot that combine search engines and social networks.

- **Cinema** and **Video On Demand** that combine social networks, such as the **Univers Ciné** service proposed by the Institut of Research and Innovation, Univers Ciné and the Sony CSL laboratory, and designed for film enthusiasts and for the sharing of movie sequence multimedia flags.

- Services that combine various media, **TVIP and the Internet**, such as **Zoond** of Fair Play Interactive, first TVIP customised according to tastes and humours of TV viewers; or **Diam** of Mondomix, which allows buying and downloading MP3 files from an interactive musical TV channel.

- **B2B** professional services such as **ePli THD** that allows express transfer of voluminous files between users with high speed broadband connection, a service proposed by ePli.

A High Speed Broadband Usage Development Observatory

Observations cover an optical-fibre subscriber panel recruited within the framework of the project and user panels specific to each service being experimented. Their aim is to get an overall picture of emerging usages on HSBB networks and of most promising services.

A Unique Panel of FTTH Optical-Fibre Subscribers in France

2,300 households living in the Ile-de-France (Greater Paris) Region make up a unique FTTH optical-fibre subscriber panel in France. The Institut Telecom is in charge of steering the setting up of the panel and ensuring its representativeness and its adaptation, with Mediamétrie, while optical fibre is being rolled out in the Greater Paris Region.

The Institut Telecom

The Institut Telecom, a public administrative body operating under the authority of the Ministry of the Economy, Industry and Employment, gathers world famous Grandes Ecoles (Telecom ParisTech, Telecom Bretagne, Telecom Sud Paris and Telecom Ecole de Management) whose mission has to do with higher education, research and innovation in the field of information and communication sciences and technologies. Dissemination of scientific, technical and economic knowledge and business start-up assistance are another important part of their activity.

Mediamétrie

Mediamétrie is an independent body whose expertise in recruiting and managing panels, analysing audiences and publishing surveys in both traditional media and in the field of new information and communication technologies is recognised at French, European and international levels.

Setting up the HSBB Panel

Within the framework of the THD Platform, the Institut Telecom has tasked Mediamétrie with recruiting a “Panel THD” or HSSB Panel of 2,300 FTTH optical-fibre connexion household subscribers, whatever their operator (Orange, SFR, Free…), as close as possible to the on-site reality in terms of available offers for the end-users.

Households are disseminated throughout the Greater Paris Region in order to ensure the demographic representativeness of the region's territories as well as of their social and economic characteristics. The panel is composed of members the majority of which are to date 35 to 64 years old.

Recruitment is planned in three phases so as to accompany the roll-out of optical fibre in the Ile-de-France region and to enable the fairest possible representativeness of the HSBB Panel in terms of social, demographic and territorial criteria.

The first round of recruitment of 850 households started in eraly September 2009 and ended in late November 2009. A second round of recruitment of 750 households is planned for December 2009. The last recruitment phase is planned for the second half of 2010.

Multifocal High Speed Broadband Usage Monitoring

What are generic high speed broadband usages and what are emerging and specific usages in relation to the THD Platform's ongoing experimentations? TELECOM ParisTech analyses HSBB Panel usage surveys as well as quantitative and qualitative elements derived from services being experimented on the THD Platform. Orange Labs focuses its work on videotelephony by assuming that video usages in the broad sense may become the key factor in the decision of subscribing to optical fibre. The IRI studies new cultural practices, including high speed broadband network web 2.0-based community practices: self-production, diffusion, indexing, etc.

Analysing Generic High Speed Broadband Usages

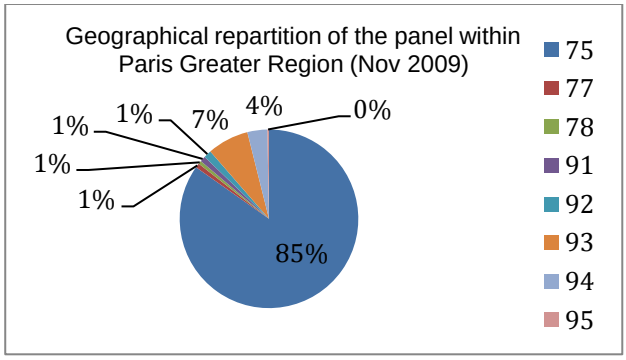
Telecom Paris Tech

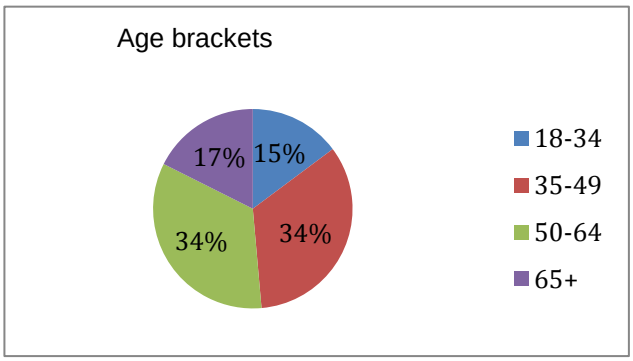
The Department of Economic and Social Sciences (SES) of TELECOM Paris Tech is renowned for its multidisciplinary competencies (economy, sociology, management, information and communication sciences); as far as research on service usages are concerned, it has been more particularly interested in geo-localised broadband mobile multimedia services, broadband service usages in private and professional environments (videotelephony, Skype), exchanges of multimedia files over the Internet, network game usages, etc. In addition, the ESS Department has been developing a specific strategy centred on ergonomics and service co-design.

Start-up Surveys

These surveys, to be conducted with all panel members, will take place after each panel member recruitment phase (in the third and fourth quarters of 2009 and in the first quarter of 2010).

The first recruitment has been finalised. To date, the panel gathers 815 households from the Greater Paris Region disseminated as follows:





Start-up surveys aim to collect household-related information on several core issues: equipments, HSBB installation, usages, expectations, motivations and concerns.

Questionnaires have 40 questions. They are administered via the website dedicated to the HSBB Panel, in CAWI (Computer-Assisted Web Interviewing) mode, and target the reference person (by including equipment and household-related questions) and all household members (with a lighter "user" questionnaire).

Barometer Surveys

The objective of these surveys is to measure the evolutions of user practices over time. They started in October 2009.

Questionnaires, of an indicative volume of about 50 questions, are submitted every three months to all panel members. They are intended for the reference person, but also for household members.

Issue-Based Surveys

Issue-based surveys with the HSBB Panel (VOD, on-line games, music, videoconferencing, telework…) are also planned according to first surveys and feedback.

A comparison of ADSL/HSBB usages is also carried out as and when required to fine-tune surveys interpretation.

Analysing Emerging Usages Related to Services Being Experimented

The aim of the "service experimentation feedback" is to analyse, within the framework of the THD Platform, usages developed by users for each tested service, and to provide answering elements on both consumption rates and exchanged volumes for each service, and on users' feeling about such services.

This work is carried out by the team of the ESS Department of TELECOM ParisTech.

Expected outputs

Two main outputs are expected:

- Analyses showing contextual aspects of usage development and hindrance factors. It will support scientific usage analysis, HSBB project-related communication and partners' activities.
- Experimentation feedback focusing on demand and users' expectations in terms of tender evolution (for the THD project and its partners and funders) and of service co-design (for platform service providers).

Methodology

The customised service experimentation assessment includes both quantitative and qualitative dimensions.

The quantitative dimension relies on metrologic data recovered for each service via the HSBB service portal or the project leader. It allows highlighting each service actual usage levels, frequency and pace, and defining users' profile (CSP, community…) within the framework of the THD Platform.

The qualitative dimension follows the quantitative dimension. It allows taking the service usage analysis further by giving users the opportunity to tell about their usage experience and to focus on issues that are most important to project leaders.

First, questionnaire-based surveys will be carried out for each experimentation with HSBB panel members recruited by the Institut Telecom via Mediamétrie.

Subsequently, a qualitative survey methodology will be selected jointly by project leaders and TELECOM ParisTech, according to the expectations expressed by project leaders about the experimentation feedback on its service and the degree of maturity of reported service and usages, highlighted by the results of the service metrologic data analysis. It can be either:

- Focus groups – Groups of users and/or potential users address various issues defined by project leaders: service ergonomics, usage impression...
- Individual user interviews – They address the various usage forms, user's expectations and any usability and acceptability problem. They may be extended to other household members if the collective dimension prevails among users.
- Capture of video sequences at service users' place – It allows getting upstream feedback on usages and recommendations for the enhancement of services before their commercial roll-out.

Focus on Video Service Usages in Domestic Space

In recent years, the popularity of on-line video contents (YouTube, Dailymotion, GoogleVideo) has kept increasing and a new practice of viewing TV series and cinema previews (Wat TV, Wideo, etc.) has emerged. On the other hand, videotelephony tools embedded in most instant messaging systems are barely used. Indeed, the ADSL bandwidth does not provide a sufficient fluidity in a remote interaction. This is no hindrance for video downloading and viewing on a PC, but this makes live conversations difficult and de facto hinders the development of this kind of usages. One might think, given this apparent gap, that one of the reasons why videotelephony is not used is merely technical, and that hindrances could be overcome by increasing the bandwidth allowed by HSBB. Video usages, in a broad sense, may then become the key factor in deciding to subscribe to optical fibre.

Orange Labs

Orange Labs is the Research & Development division of France Telecom, the historic French telephone operator.

The aim of this work is to analyse video service usages in domestic space and to gain an insight of the chances of potential videotelephony communication services such as broadband videoconference as proposed in the project by Orange to develop.

The methodology applied consists in carrying out on-site video observations in a limited number of households selected among service experimentation participants. The video recording methodology aims to allow a fine and detailed review of how users take ownership of these services and of their emerging context.

The advantage of video is that it allows gaining a very concrete insight of usages, behaviours, possible difficulties encountered by users, etc. Observations take place during several days depending on field possibilities. Observation-recording moments are defined in conjunction with participants. These video observations are supplemented by self-confrontation interviews, which consist in showing video recordings to participants to get their insight of observed actions. The aim of these interviews is thus to enrich collected data in order to understand observed users' behaviours and how they take ownership of services.

From Usage to Practice: The Case of Cultural Technologies

The IRI proposes a prospective analysis of high speed broadband related cultural practices by exploring amateur profile versus non-professional producer (or prosumer) profile mainly targeted by social engineering strategists. Amateurs prefer community exchanges, analytical tools and critical devices (especially reviews). They mainly produce metadata (from simple tags or *folksonomies* to feature articles on Wikipedia).

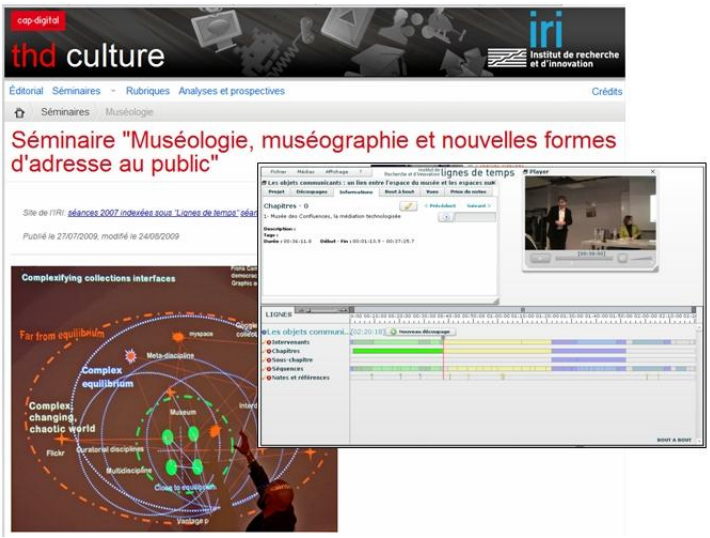
The IRI and the Pompidou Centre

The Pompidou Centre's Institute of Research and Innovation (IRI) conducts research on cultural educational technologies and new forms of "address to the public" dealing more specifically with new ways of making works of the mind and specific publics meet. The IRI designs mock-ups and prototypes in partnership with public or private laboratories and with industrial organisations. The IRI's research goes beyond the mere context of cultural mediation technologies by reconsidering them from the perspective of fostering the creation of "amateur circles", as opposed to consumerist users.

The IRI proposes this prospective reflection to interested professionals, experts and researchers through an Observatory of digital cultural practices and, based on multiple theoretical methods, through research seminars/colloquiums, which are flagged, analysed, published and used as part of a collaborative review. This approach, between 2008 and 2009, entailed the following:

1. The organisation of 4 research seminars/colloquiums on cultural practice issues based on contribution-oriented digital technologies enabled by high speed broadband;
2. The publication of a collaborative review, THD Culture (http://thdculture.fr), dedicated to these themes and using innovating tools, including for flagging and analysing seminar sequence recordings (via the Lignes de temps software proposed on the THD Culture website) and sharing flags and comments;

3. Based on the collaborative use of these theoretical materials and on multiple theoretical methods, the setting up of an Observatory of digital cultural practices.



Methodologies used

The IRI has introduced a specific analysis methodology within the framework of its Observatory of digital cultural practices in the context of the HSBB project. This is how once so-called communication technologies (digital technologies implemented in the audiovisual industry) are called by the IRI. These now digitalised technologies, which have grown similar to cognitive technologies, enable the general public to access functions that only professionals used to be able to access before: self-production, diffusion, indexing, etc. The Observatory implements a method that consists in describing past and potential developments of the technical system within which cultural technologies have been developing i.e., in this case, the digital network technology system. The aim of the Observatory of cultural technologies is to define the scope of the technical system of network technologies. Such scoping is a caricature: it consists in taking one aspect into account (in this case, cultural technologies), by neglecting aspects considered as secondary from such perspective. A caricature distorts reality, but it generally allows distinguishing its characteristic traits.

The approach consists in producing three types of caricatures:

- a caricature of the present situation,
- a caricature of stages that have lead to the present situation (through a system morphogenesis),
- a caricature of potential future situations in a given timeframe.

These caricatures are produced in the form of functional graphs through regular seminars (usually convened every month) that analyse and qualify the information provided by a network. The network itself consists in a website that edits these graphs and that enables contributors to document functional evolutions of a technical system or of social systems in which this system is immersed. These functional data are like the various rubrics of an editorial team, who uses the seminars as editorial conferences and as editorial board. The HSBB seminar's outcomes are assumptions for the future that are corrected at the pace of the successive seminar's sessions, which are like the beats of a clock. The seminary can produce alternative or even competing assumptions. The IRI has been developing this seminary by bringing various players together, including some members of the IRI (Institut Telecom, ENSCI, Goldsmiths College, CCCB, Fing, Cap Digital, Microsoft), and by ensuring that it mainly benefits the Cyber Pompidou Centre's team.

Work carried out

- *Research seminars*

The aim of the four seminars listed above was to theorise and to formalise the outcomes of technological research work and to confront them to culture and human science research objects by reconsidering, against this background, the most common issues about disciplines relating to aesthetic, art history, psychology, philosophy, mainly from the perspective of

the relation between life of mind and techniques. All seminary sessions were recorded to enable flagging and indexing under Lignes de temps and direct access to their content from a text-oriented search engine by means of which relevant sessions and contents can be selected within time objects.

Four seminars and colloquiums have been organised, flagged, edited and used within the framework of the Observatory and the THD Culture review since October 2008:

- *Museology and New Forms of Address to the Public* (in partnership with the MRT and the DMF / Ministry of Culture): 5 sessions were held between October 2008 and March 2009;

- *Amateur Policies and Technologies*, coordinated by Laurence Allard, lecturer in communication sciences at the University of Lille 3: 11 sessions were held between November 2008 and June 2009;

- *Social Network Cultures, Policies and Engineering*, a colloquium organised in partnership with the ENSCI (Ecole Nationale Supérieure de Création Industrielle) and Cap Digital as part of the second session of the New Industrial World Interviews, under the coordination of Bernard Stiegler: 7 sessions were organised on October 3-4, 2008.

- *The New Object System*, a colloquium organised in partnership with the ENSCI and Cap Digital as part of the third session of the New Industrial World Interviews, under the coordination of Bernard Stiegler: 6 sessions were organised on November 26-27, 2009.

A collaborative flagging tool was set up in the THD Culture review website, where recordings of these seminars are posted. This tool enables signed-in website visitors to add commentaries and flags directly in seminary recordings.

➢ *The THD Culture Review*

"THD Culture" is an on-line review initiated and published as part of the HSBB project WP 6.2. This publication, which is coordinated by the IRI, is thus part of the monitoring of HSBB-related practices whose aim is to propose a framework to discuss and analyse web-related social and cultural practices and to gain an insight of practice transformations, so as to better anticipate service innovations and potential market.

➢ *The Observatory of Cultural Practices*

The development of THD Culture allows gradually setting up a real observatory of these new practices at both individual and collective levels. Such practices, indeed, are more specifically reviewed from the perspective of qualitative evolutions brought about by the emergence of high speed broadband transmission technologies (mainly optical fibre and Wimax) and, in the context of their articulation with the issue of decentralised social networks, of mobility, of communicating objects and of emerging grammatisation or audio and video writing forms.

Scientific results and perspectives of valorisation of the work conducted within the framework of THD Culture are as follows:

- Qualitative appraisal of new collaborative cultural practices on the Internet, which require implementing high speed broadband technologies;
- Identification of challenges and hindrances to overcome for the development of practices instrumented in the cultural sector, and more particularly in a museum-like context (before, during and after the visit);
- Appraisal of technological and cultural contexts related to addiction phenomena and analysis of psychopathologies identified in various countries;
- Identification of economic models and of technological transfer potentialities for businesses of the Cap Digital Paris Region Competitiveness Cluster.
-

The Evolution of Networks in the HSBB Era

The AFNIC and the L2TI are partners of the Vtech (“Veille Technologique” or Technological Monitoring) packet as part of the work conducted by the THD Platform. This monitoring activity covers a wide range of issues in relation with Internet networks, protocols and communication services. The outcomes from this monitoring activity are valorised in various circles depending on the concerned/interested targets. The latter include the other partners of the resource cluster’s project leaders as well as a wide public interested in HSBB technologies, including the platform’s user panel, THD portal visitors or Cap Digital Competitiveness Cluster members.

The AFNIC

An extension of the INRIA, the AFNIC is a non-profit association that was founded by French public authorities in 1997. Its purpose is to manage first-level French extensions, including .fr extensions. It is also to carry out the technological monitoring and the transfer of knowledge and know-how at both national and international levels.

Since its creation, the AFNIC has been doing technological monitoring in its core business (Internet domain name registering for .fr and .re extensions) and in associated domains in a quite broad perimeter. Indeed, as “Network Information Center” (NIC), it plays a key role in the French Internet space. In this regard, the AFNIC has been actively monitoring evolutions related to the Internet network architecture (naming, addressing, routing…), to the standardisation of communication services and protocols (IETF) and to Internet resource management/coordination.

The L2TI

The L2TI laboratory (information transport and processing laboratory) of the University of Paris 13 is a CNRS (EA3043) welcoming team of 40 researchers (17 regular employees and about 20 young doctoral students/graduates). The L2TI focuses on computing networks and image processing.

Role and Objectives of the Monitoring Activity

The main objectives of this activity are:

- help professionals identify technological ruptures and those that are promising, in relation with their businesses, to enable them to improve/preserve their competitiveness and their innovation capacity;
- make HSBB beneficiaries aware of technologies, usages and applications that benefit from this environment by explaining them, in a pedagogical way, concepts, challenges and good practices;

This activity is part of an approach of scientific and strategic advice to HSBB partners delivered for the whole project duration. It also provides additional comprehension elements for the perpetuation of the platform.

Monitoring fields

Monitoring activities carried out by these partners usually include a number of competencies in relation with the THD Platform:

- **HSBB transmission vectors**: wireless communication, optical networks
- **Architectures and network protocols**: capacity, sizing, IPv6, self-configurable / self-standing networks, F-M convergence, mobility, multihoming
- **Services and applications**: customer/server vs p2p architecture, object-based Internet, network games, video transmission…
- **Safety**: anti-spam/virus fight, applicative safety
- **Internet governance**: standardisation of protocols and coordination of Internet resources

Work streams

Work has been carried out in several areas of which an overview is given here below:

- Diffusion monitoring documents:
  Vtech framing document (covered technological domains)
  Thematic sheets: succinct sheets describing addressed issues (state of the art, ongoing works, challenges…) and their relation with HSBB
  Mission reports: participation in conferences, meetings and seminars

- Publication of scientific articles: two analysis and technological monitoring articles on optical networks

- Participation to international meetings and conferences the minutes of which are published. A few examples of meetings/conferences are given here below:
  - RIPE Meetings 57-58 (2008-2009)
  - IETF Meetings 73-75 (2008-2009)
  - IEEE GlobeCom Conference, December 2008
  - "WONS 2009" Conference, February 2009

Encourage discussions on HSBB

By conducting their technological motoring activity beyond HSBB, Vtech partners have been deliberately trying to get a broader vision than the quite precise context of the platform. Indeed, Vtech partners have been delivering their critical analysis as part of a longer-term HSBB overall evolution approach. So, for example, the following issues are being debated:

- High speed broadband (HSBB) – a very vague notion
  - Definition of qualifying rate: What network may or may not be considered as a high speed broadband network? What are criteria and thresholds?
  - High speed broadband is not bound to a unique infrastructure technology, optical fibre. Other technologies are also eligible: Wwimax, cable, ADSL2…
  - What do HSBB users/subscribers perceive? Their ISP's access network or the whole Internet?
  - What should be the role of ISP/operators?
    - Ongoing evolution loop: anticipating usages – sizing infrastructure – measuring usage – identifying evolution.
    - Cooperation between networks players…

- About peer-to-peer (P2P) networks
  - Several research teams have dedicated their work to it at world level.
  - Standardisation bodies (e.g. IETF) are in charge of reviewing viable models (alto, p4p…).
  - Some operators carry out experimentations in their access networks (maximisation of P2P exchanges between customers of the same operator to spare bandwidth).

- In spite of these advantages, high speed broadband also introduces new safety risks:
  - Increase of (D)DoS attack ris/impacts from network ends?
  - How to size and protect one's infrastructure?

Digital Content and Service Production and Diffusion Value Chain in the face of High Speed Broadband Network Development

In an evolving context characterised by the "new technological frontier" of increasingly ubiquitous networks, a spectacular increase in bandwidth rates and the development of cloud computing, where players' agility sometimes prevails over size, where the need to attract audience encourages the provision of free services while actively seeking new compensation models, where innovation is accelerating while being increasingly steered by users, where the role of ecosystems based at least partially on open approaches has been asserting itself with regards to "Walled Gardens", the aim of the Maison des Sciences de l'Homme (MSH) Paris Nord, within the THD Platform, is to explore consequences and challenges of high speed broadband in various economic sectors.

To that effect, it has been defining a **benchmark of innovating services** in relation with foreign platforms' experimentations and has been developing an in-depth analysis of value chain evolutions and of the overhaul of concerned industrial sectors.

It is an original approach insofar as **the works has been conducted by information and communication science researchers** of the MSH-Paris Nord. Supported by the CNRS (National Center for Scientific Research) and the universities of Paris 8 and Paris 13 that came together to create it, the MSH-Paris Nord, based in Saint-Denis, is a structure that fosters and disseminates social sciences and that has been playing a leading role within the scientific community in the two fields in which it was tasked to intervene in 2001 by the Ministry of Research and the Ministry of National Education: Culture & Art Industries, on the one hand, and Health & Society on the other hand.

The aim is to produce an analytical and reflection tool for the framing of subsequent developments and the highlighting of outcomes from the ongoing phase.

The aim of the selected approach is to **highlight as contrasted player situations and stances as possible**. From this contrastive perspective, the team has been more particularly endeavouring to determine whether content industrialists on the one hand or content-support and access industrialists on the other hand were likely to get the upper hand on the HSBB market and what, based on these various approaches, could happen for creators and creation.

And hence, the 14-researcher team first met a few French high speed broadband sector's players to better define the study perimeter. They then engaged into an in-depth critical analysis of available reports such as those of the FTTH Council, the OECD, the ITU, the World Economic Forum, the Commission of the European Communities and the ERG, studies of the Oxford University's Saïd Business School and of the Oviedo University sponsored by Cisco or, more recently, of the Harvard University's Berkman Center, carried out upon the request of the FCC. This analysis also took into account sector-based reports such as Digital Britain or other national plans as well as the results of the European Network of Living Labs or consulting firm studies (Idate, Point Topic, Telegeography…).

The analytical grid is based on a contrastive approach that seeks to identify exemplary situations conducive to possible **rupture scenarios in five applications** considered as most relevant:

- **New forms of television** tending towards less and less linear programmes with the integration of both OTT (Over The Top, including new contents generated by users themselves) and TV on IP approaches (in particular with the development of VoD and the flexibility of the Catch Up TV that combine in line with approaches like "Walled Garden" or other more open approaches), but also by looking at the possible downstream movement of value through new TV sets or Set Top Boxes directly connected to the Internet or through Hybrid Broadcast Broadband projects developed by TV channels.
- **Development of Internet access on mobile phones** and more specifically the various possible forms of the development of mobile personal television in unicast mode on 3G networks and their successive upgrades (and soon LTE) or in multicast mode.
- **New forms of network management** (Cloud Computing, Peer To Peer, intelligence dissemination, in-house management or outsourcing …) and their foreseeable consequences on models and the economy thereof.
- **New territoriality including public policies**, regulation but also conditions of emergence of new citizen-centred services, e.g. in terms of telemedicine or of telesafety.

- **Development of various forms of immersive environments** and of networked multiplayer games.

In each case, the reflection articulates around the analysis of social and economic approaches with regard to models developed, in particular by researchers who have been facilitating the work of the MSH-Paris Nord Observatory cultural industry mutation; such approach is in particular illustrated by the **analysis of player configurations, funding and regulation mod**es, of the institutional framework already in place or being created, of business models, of the types of coordination/cooperation models that are being developed – with the common purpose of identifying possible rupture scenarios by questioning oneself about what, if the bandwidth rate was increased, could lead a player to change its organisation.

A clarification is necessary. Although, as an initial approach, the work was to first and foremost focus on the services to be rolled out over the various optical fibre networks technologies with higher bandwidth rates than those of the ADSL 2+, it became clear, as the setting up of platform resources progressed, that it was no longer possible to neglect new perspectives brought about by high speed broadband nomadism, whether in relation to 3G networks mobiles 3G or, in the future, LTE, or to other types of wireless connectivity (WiMax or shared WiFi). As the Harvard's Berkman Center shows, the MSH-Paris-Nord has thus now adopted a broadened Next Generation Connectivity approach for analysing consequences of what George Gilder called, in 1995, the "Negroponte switch", not to mention the fact that, although the vision of possible evolutions is often relevant, their lead times are often very much underestimated, and that they actually more often take the form of a transition rather than of a disruption, while new and traditional forms generally coexist on quite long periods of time.

Concretely, the first phase of the project is devoted to the identification of most significant new services, based on reports that have already been analysed and on the acquisition of studies and additional information sources. It entails a series of investigation visits that will involve local partners (researcher networks, economic position holders...). The various sectors' overhaul analysis is carried out in parallel with the development of this benchmark on innovating experimentations. A guidance report will then be drafted and a scientific colloquium will be organised. The team is currently also working on the setting up of an international researcher network dedicated to these issues, under the joint authority of the Observatory of cultural industry mutations of MSH Paris Nord and Cap Digital. In particular, regular contacts will be established with the team of the Harvard's Berkman Center. For the duration of the project, a strong focus is also placed on the dissemination of results, including partial ones: workshops for HSBB partners, documents, visit reports, interviews, to be posted on the project website, organisation of awareness raising meetings for the public…

Pays	Phénomène	Acteurs dominants	Nouveaux entrants (OTT en facteur)	Contexte
Monde	OTT	YouTube (Google) Dailymotion FaceBook Joost (*RIP*)	▪ fabricants de Internet Enabled TV ▪ fabricants de console et autres terminaux ▪ Yahoo Widgets ▪ Apple : iPod + LG ?	• Croissance de la qualité (adaptative streaming, haut débit).
USA	VoD	Comcast (pay per bit) Netflix iTunes TiVo Verizon FiOS AT&T	▪ Hulu (NBC, News Corp, Providence Equity et Walt Disney). ▪ Time Warner TV Everywhere ▪ ATSC M/H ? ▪ Qualcomm MediaFlo (clipcasting)	• Hégémonie du cable • Performances limitées de l'ADSL (topologie des réseaux)
UK	VoD	BBC iPlayer ITV, Channel 4 BT ?	▪ BBC Canvas ? ▪ Arqiva (ex BBC Kangaroo)	• TV par satellite dominante, Haut débit en retrait
France	VoD	Orange (FAI + contenu) Free (d'abord FAI) SFR Numéricâble	▪ TDF (pushVoD sur TMP ?) ▪ HbbTV (hybrid broadband broadcast), les chaînes ▪ TV Perso Free	• Leader IPTV • Extension limitée du câble, bonne qualité de l'ADSL
Japon	VoD	NTT Hikari TV), KDDI, SoftBank BB	▪ AcTVila ex Sony Bravia + lecteur Blu-Ray • J:Com	• Incitation publique. • Tardif • 160 Mbps, Docsis 3.0
Corée	VoD	KT, SK Broadband, LG Powercom TMP		• Politique publique. • Tardif, obstacles réglementaires levés en 12/2008.

Enhancing the HSBB Ecosystem's Dynamics

The THD Platform has been contributing to the reflection on the development of networks and of high speed broadband services meant to foster the emergence of economic models for all domain players. As a publicly funded platform and due its independency from all operators, it is supposed to carry out an as wide communication of the results of the activities carried out by its partners as possible, within certain confidentiality limits.

A number of platform's schemes were developed to allow transmitting such information to various types of interested players: platform partners, experimentation project leaders, Digital Service and Content sectors businesses.

With Partners of the THD Platform

Besides experimentation feedback from Telecom ParisTech, the results of usage monitoring work and studies can be accessed by all platform partners and project leaders. They are available on a groupware that about a hundred people can access.

This groupware has specifically been developed by Jamespot as a communication and exchange tool for THD Platform players. It includes a THD monitoring blog and several discussion spaces open to contributions of all partners.

THD Platform experimentation project leaders can also mobilise technological, social and economic monitoring players on specific matters in relation with their businesses.

With On-line Services and Digital Content Businesses

- The THD portal, www.portailthd.fr, showcase of new services and digital contents

Projects being experimented as well as those of businesses that are conducting them are described on the THD portal and can be accessed by all web users. The THD portal enables all digital content sector players to very concretely apprehend innovations allowed by high speed broadband in this field.

The THD portal takes over the communication of information on high speed broadband, the THD Platform, the resources it proposes and overall high speed broadband monitoring for businesses.

Documents produced by partners are circulated there as and when required, and the whole documentation is stored issue-wise in a dedicated section. The THD portal is moderated by Silicon Sentier.

- HSBB workshops to debate technical and economic challenges related to high speed broadband network contents and services

The technical, economic and legal impacts of HSSB as well as prospective issues are addressed in public issue-based workshops with experts, researchers and businesses, and in presentations, round tables and debates with personalities who do not belong to the platform. These workshops are hosted by both Ile-de-France cultural institutions – the City of Sciences and Industry and the Pompidou Centre.

The following workshops already took place: *Internet governance* (AFNIC), *Optical Networks* (University of Paris 13) and *HSBB Video Games and Networks* (with the participation of Stéphane Natkin and Philippe Ulrich)

Next scheduled workshops are:

- *HSBB Economic Models: Streaming and Downloading* (January 2010)
- *HSBB and eLearning* (February 2010)
- *Cinema and HSBB* (March 2010)
- *Interactive TV and HSBB* (March 2010 – to be confirmed)
- *HSBB Economic Models: Niche Markets and Exclusivities* (April 2010)
- *IPv6 and HSBB: Users' Needs and the Role of Service Providers* (April 2010)
- *HSBB and Conference Webcasting* (June 2010)
- *New Digital Practices Derived from HSBB* (Sept. 2010 – to be confirmed)
- *HSBB and Serious Games* (October 2010 – to be confirmed)
- *HSBB and Digital Creation* (October 2010 – to be confirmed)

Other themes as follows are in the pipeline: *Seamless HSBB Services and Networks* or *Music and HSBB, the Economic Model of Dematerialised Products, the Cloud Computing Market*.

With the Scientific Community

The cycle of workshops described here above includes communications of researchers who have been participating in the work of the platform. Other researchers are also likely to intervene in these workshops.

Moreover, in early 2011, a scientific symposium in which the ongoing work will be analysed will gather representatives of French and foreign researchers who participated in the technological, social and economic monitoring work and in the studies on the THD Platform usages.

With the General Public

- Exchanging on HSBB experimentations

25 different services can be tested by optical-fibre or ADSL subscribers via the THD portal. The THD portal is designed as a tool to facilitate the work of various user communities: a forum dedicated to each service enables web users to exchange on their appreciation of the corresponding service or on their new usage experiences allowed by increased bandwidth rates, to comment on blog entries, to participate in beta testing…

Silicon Sentier, a cluster of innovating technological businesses in Paris, also proposes each experimentation project leader to organise a workshop to meet its users in an open innovation and joint service production approach.

These meetings are held in La Cantine, a networked collaborative working space ("co-working space") for businesses from the digital content business sector to address issues in relation to their services, and for project leaders to meet their service users.

This scheme combined with Telecom Paris Tech's qualitative studies resulted in the integration of the ENoLL network to the THD Platform as early as late 2008.

- Showcasing new high speed broadband network services and contents

Two demonstration spaces have been set up in two emblematic places in Paris: the City of Sciences and Industry and the Pompidou Centre, where events are organised by the THD Platform and whose agenda is partly dedicated to HSBB, based on their own agenda.

The Pompidou Centre demonstrator focuses on the issue of cultural services and artistic creation. The agenda is jointly defined with the Institute of Research and Innovation and relies on the Pompidou Centre's overall agenda.

The City of Sciences and Industry demonstrator focuses on the issue of educational and professional services. It is located at the "Carrefour Numérique" and consists in two permanent spaces dedicated to HSBB: the "Studio du THD", where the technology and various projects developed by partners and, partly, other exhibition elements are presented. The latter are designed and implemented by the City of Sciences and Industry and the "Galerie du THD", through which a videoconference can be organised between two remote points of the City of Sciences and Industry's various spaces. The scheme includes enhanced reality elements.

The City of Sciences and Industry is also engaged in the production of documentary resources, i.e. reports on experimentation projects installed on the platform, animations putting the HSBB technology and their related usages into perspective and populating thematic sheets on new high speed broadband network related practices.

- A show for the general public in late 2010

All experimentation projects hosted by the THD Platform over the two-year project period will be presented in a show for the general public in late 2010 by the City of Sciences and Industry. They will be put into perspective with regard to evolutions of high speed broadband over such period.

THD Platform Players

Platform Coordination

	Partner	Business fields	Role in the THD Platform
cap-digital	**CAP DIGITAL**	Moderation of the Cap Digital Competitiveness Cluster on activities of the Ile-de-France Region's digital content-related business sector	Platform Leader
tecdev	**TECDEV** (subcontractor)	Elaboration and coordination of technological projects	Platform coordination
Silicon Sentier	**SILICON SENTIER** (subcontractor)	Moderation of a technological business cluster	Moderation of the THD service portal

Resource Cluster

	Partner	Business fields	Role in the THD Platform
UNIVERSITÉ PARIS 13 NORD	**University of Paris 13** **Institut GALILEE / L2TI**	Lines of research: Research on telecommunication and multimedia communication networks broadband networks	Coordination of hosting resources: test bed and data centre
INSTITUT TELECOM / TELECOM ParisTech	**INSTITUT TELECOM / TELECOM PARIS TECH** Department of Economic and Social Sciences	Lines of research: Research on innovation processes and technical scheme usages	Construction of the THD Panel and supervision of beta testing of services being experimented
Maison des Sciences de l'Homme Paris Nord / CNRS	**MSH Paris Nord** LABSIC – PLATFORM TECHNOLOGICAL AST	Lines of research: Social and economic analysis of cultural industries and industrial convergences and organisation of communication markets	Social and economic monitoring

Centre Pompidou	**POMPIDOU CENTRE**	Work streams: New cultural practices	Demonstrator
IRI Institut de Recherche et Innovation	**IRI** – Institute of Research and Innovation	Lines of research: Cultural and educational technologies encouraging the emergence of new practices	Cultural practice monitoring
cité des sciences & de l'industrie	**CITY OF SCIENCES AND INDUSTRY**	Work streams: Methods and technologies encouraging new practices for the acquisition of a scientific, technical and industrial culture	Demonstrator
bearstech	**BEARSTECH**	Free software-based data-processing solutions, web applications	Methodological and technical assistance for designing prototypes
FABERNOVEL	**FABERNOVEL**	Innovation strategy, organisation, experimentation, management of innovating projects	Study for the perpetuation of the data centre
AFNIC	**AFNIC** – French Association for the Internet Naming in Cooperation	Lines of monitoring and research: Networks, protocols and Internet services	Technological monitoring
GIE CB	**GIE** – Groupement des Cartes Bancaires	Lines of monitoring and research: New solutions for the secured payment of on-line services, specific terminals, authentication systems	Advise on secured transaction systems

AD VALEM TECHNOLOGIES	**AD VALEM TECHNOLOGIES** (Paris 13 subcontractor)	Internet solutions operator – dedicated hosting	Data centre
mediametrie	**MEDIAMETRIE** (Institut Telecom subcontractor)	Poll institute	Construction of the THD Panel steered by the Institut Telecom

HSBB Experimentation Projects

	Businesses	Business fields	Project	Experimentation HSBB
	ORANGE	Telecommunication operator	**Visio HD**	General public broadband videoconference
	MAXICOURS	Management of a base of pedagogic contents, on-line school assistance	**Cyberclasse**	Session of web-based interactive classes
	E-PLI	Secured transfer of voluminous computer files	**ePliHSBB**	Express transport of voluminous files
	VIRTUALDIVE	Development of innovating solutions in the sector of sub-aquatic tourism	**Digital Ocean**	Rich Media collaborative platform for the creation of 3D submarine environments
	CHUGULU GAMES	Development and distribution of on-line video games	**Pong Reloaded**	Real-time and multiplayer collision games
	METABOLI	Distribution of video games through downloading		3D distribution portal
	IRI	Lines of research: Cultural and educational technologies encouraging the emergence of new practices	**Flagging**	Collaborative flagging of film abstracts
	SONY COMPUTER SCIENCE LABORATORY	Laboratory for robotics, music, cognitive sciences, communication	**Flagging**	Collaborative flagging of film abstracts

	UNIVERS CINE The Best of French Movies	On-demand video portal	**Flagging**	Collaborative flagging of film abstracts
	FAIR PLAY INTERACTIVE	TV over IP	**Zoond**	Interactive customised music TV channel
	TIVIPRO	Platform of video communication for professionals	**Pic2Clip**	Creation of video clips from still images
	VOXLER	Middleware technology dedicated to voice interaction	**Karaoke 2.0**	Karaoke session with remote participants
	UBICAST	Automated video capture and publication	**ForumMedia**	Video capture and editing
	MONDOMIX	Web media dedicated to world music	**DIAM**	Purchase of mp3 on a VOD channel
	JAMESPOT	Search engine	**JamesPill's**	Search engine integrating data of social networks
	NAVIDIS	Geographic information system	**TI HSBB**	SIG 3D rich media enrichment
	STUDIO BROCELIANDE	Moderation studio	**MESSANN**	Sending of messages by mail or on mobile phones through characters animated by senders
	SCIENCES&Co	Scientific editor	**Broadband sciences**	Encyclopaedia service platform with participative audiovisual content

STAR-APIC	**STAR APIC**	Geographic information system	**Terra Numerica**	3D demonstrator
ERDENET	**ERDENET**	Pedagogical content platform	**Erdenet**	Real-time educational platform integrating a Video Learning Objects creation and sharing solution
nomao	**NOMAO**	Search engine	**Nomao**	Customised search engine driven by user affinities with cartographic restitution of results
VodDnet™	**VODDNET**	VOD solution provider	**Yoused**	Market place allowing secured and legal sell-out of video files
3D2+	**3D2+**	Multimedia creation and production specialised in the creation of community or non-community 3D universe	**3DXMedia**	TV program in a 3D universe
	ISI	Image and document storage, management and diffusion service provider	**Teleclasse**	Incorporation of audio-video dialogues between teachers and learners in a flipbook interface
REMU.FR	**REMU**	Creation and artistic and cultural events, development of ICT schemes at the service of artistic and cultural creations	**Live Music Cast**	Organisation of a concert with simultaneous participation of musicians in France and in South Africa
IPCine.com	**iP…Ciné**	Secured transport and diffusion, web-based movie and audiovisual content editing	**eKinoe**	High-definition (2K/4K, Relief 3D,…) movie content transport and diffusion for movie theatre operators
wmedia	**WMedia**	Multimedia group specialized in video content	**Iagregamedia**	Developing a platform that pools video content dedicated to new media (VOD, CAD, and Web)
	IDAaas	Development and marketing of systems and products related to automatic learning and to the extraction of knowledge based on data and artificial intelligence	**IDAaas**	Tool for upgrading large volume data derived from artificial intelligence research

Category: Marketing and Business

Company: Acreo (Sweden)

Innovation: OpenChoice- an open Broadband TV concept

Acreo – OpenChoice, an open Broadband TV concept

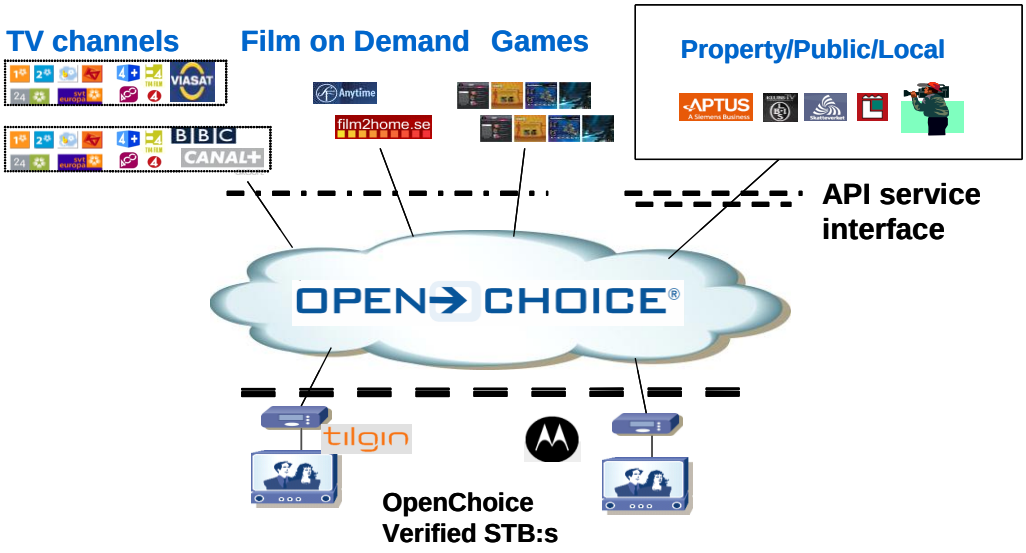
The driving force behind Open Networks is to give the enduser more choice between different service providers and for the service provider an opportunity to reach more endusers independent of chosen access provider. Unfortunately also in Open Networks the TV service has continued to be a vertical integrated service where the TV operator has his own channel packaging, his own platform, his individual encryption system and operator locked Set top boxes.

To open up the broadband TV market in Sweden an association between the big public and private property owners, the tenants organisation and the Swedish city networks association asked the research institute Acreo in Stockholm to come up with an open TV concept that could be implemented by some modifications in existing TV suppliers equipment.

The fundamental principles are

- The Set top boxes used should be independent of chosen TV operator but verified as OpenChoice Set top box
- The platform shall have a standardised OpenChoice 3:rd part API interface for TV based services
- At least two suppliers of TV channels
- The switching from one service to another should not take more than around 2 seconds

OpenChoice means that the end user can choose between different TV operators without replacing his box and that the designer of TV based services can use the simple API to reach the market independent of operator platform just it is OpenChoice. That will simplify for SME to reach the TV market and open it up for interactive local services, property services and healthcare services using the TV as a broadband terminal.



Category: Marketing and Business

Company: ECI Telecom Ltd. (Israel)

Innovation: NG FTTH Port Unbundling (Open Access)

ECI Telecom – NG FTTH Port Unbundling (Open Access)

Contact: Sandra Welfeld, Corporate Communications, +972-52-400-7283 sandra.welfeld@ecitele.com

Extract:

For years, telecom operators enjoyed monopolistic positions in the domestic telecom market. This was based on their ownership and control of the copper plants that served as the physical foundation over which they catered voice service predominantly, and data services later, to their subscribers. In the mid-90s, privatization and the opening of the market to new carriers improved the competitiveness in the telecom sector, but to lesser extent that was anticipated, as proven by the consolidation among operators.

The transition to fiber infrastructure that emanates from the need for more bandwidth offers a unique and unprecedented opportunity to change the traditional natural monopoly that stems from the ownership of the physical infrastructure. The introduction of FTTH as the future foundation for the network started the debate of point-to-point vs. point-to-multipoint architectures. Though many incumbent operators clearly advocated that GPON is the preferred technology of choice it was seen by some as a means to avoid competition due to the nature of the technology.

ECI's proposal brings down this claim. ECI's development allows for the separation of the physical ownership of the infrastructure from the telecom services provisioning. Hence, this implementation innovates in the sense that it pushes forward modern physical infrastructure based on fiber while allowing for a healthy competitive environment, so much desired by end users and intensively promoted by local regulators. The telecom entity that owns the physical infrastructure could offer telecom operators equal access to end users, thus opening up the market for true competition. ECI's approach provides incumbents and municipalities a deployment scenario that enables Network Operators to provide an open access solution with full physical handoff and unbundling of ports, to multiple Service Providers. With our architecture, Network Operators can lease, in a flexible, controlled and secure way, infrastructure to other Service Providers (SPs).

We are submitting our solution for the Marketing and Business Innovation award, as our solution is unique. It provides full compliance with regulators and governmental vision for providing such business model of Network Operators and Service Operators roles.

Business/Marketing Benefits:

In situations where competition in the last mile is desired, either due to functional separation required by the regulator or for other business reasons of the Network Operator itself (shortening the payback period, additional indirect market share, etc.), such an architecture with features as described below **provides innovative marketing and business benefits**:

- Service Providers need not invest in their own Access Infrastructure and maximize their CAPEX savings.
- Such a model provides for better service coverage, by multiple competitive Service Providers as well as lower cost for new service introduction to new areas.
- Service Providers can focus their efforts on introducing new technologies and services that are higher in the value chain. Service Provider does not need to develop infrastructure technical expertise, which is not their core business.
- Such a model enables voluntary cooperation between competing service providers.
- Access price to all service providers is the same.
- Equal starting point for all wire-line Service Providers.
- Controlled QoS means managed agreements between Network Operator and Service Providers.

Unlike solutions that rely on virtual separation only, ECI's solution provides a full solution to competitive Service Providers who would like to develop their own innovative services for their community, and control their own fiber and QoS.

Introduction:

ECI has developed an offering to implement next generation port unbundling with a full hardware handoff. Our solution and deployment approach translates governments' vision and regulatory policies of next generation broadband networks that enable high bandwidth support to the vast majority of the community homes by multiple competitive Service Providers, thus maximizing the benefits to the public.

Our solution provides an infrastructure for the Network Operator that lends itself to leasing the infrastructure to multiple Service Operators yet enabling each Service Operator to "own" its own fiber. Our network meets current and future needs of wholesale end-customers and the community they serve, as they will have significant control over their network and their ability to innovate and develop new services.

Although our offering is focused on FTTH, the architecture includes support of FTTC instances where brown field installations already exists, and for highly residential centric communities where VDSL can be utilized – either as a long term or an intermediate solution. In such cases, the architecture provides required aggregation towards the CO.

Entire infrastructure is based on the same platform with unified management.

Background:

The business model for fiber to the home (FTTH) is a difficult one to justify considering the extremely long payback period. Yet, there is increasing pressure, both competitive and political, for incumbent operators to upgrade their networks to FTTH and be able to provide advanced high-bandwidth services to their customers. In addition, municipalities who need communication infrastructure for other applications (metering, security, etc.) may want to utilize an add-on business model to their network to get additional revenues. For areas in the covered network that are vastly populated by residential customers and lower bandwidth may be sufficient, carriers may consider a network architecture that relies on FTTC architecture and combines VDSL capabilities from the street cabinet (or CO) to the homes.

As the economics of the business model for such FTTH buildup is problematic for both the telcos and their shareholders, some governments and regulators are providing incentives for such investments that promote competition, based on the belief that increased competition will benefit the end users. Incumbents are encouraged to design their network so that competitive Service Providers can lease connectivity to their customers off the installed infrastructure, thus saving the Service Provider from setting up its own infrastructure: physical separation of infrastructure leased to different SPs, accurate control of the QoS provided to the different SPs, provision of VDSL and FTTH ports from the same unit at the CO, and other important capabilities not required in regular bitstream access infrastructure.

The Main Features:

A) Infrastructure Independence:

With our deployment model, each Service Provider receives, in effect, its own separate network from the CO. There is a physical handover at the CO between the Network Operator and the Service Provider.

<u>Business implications:</u>

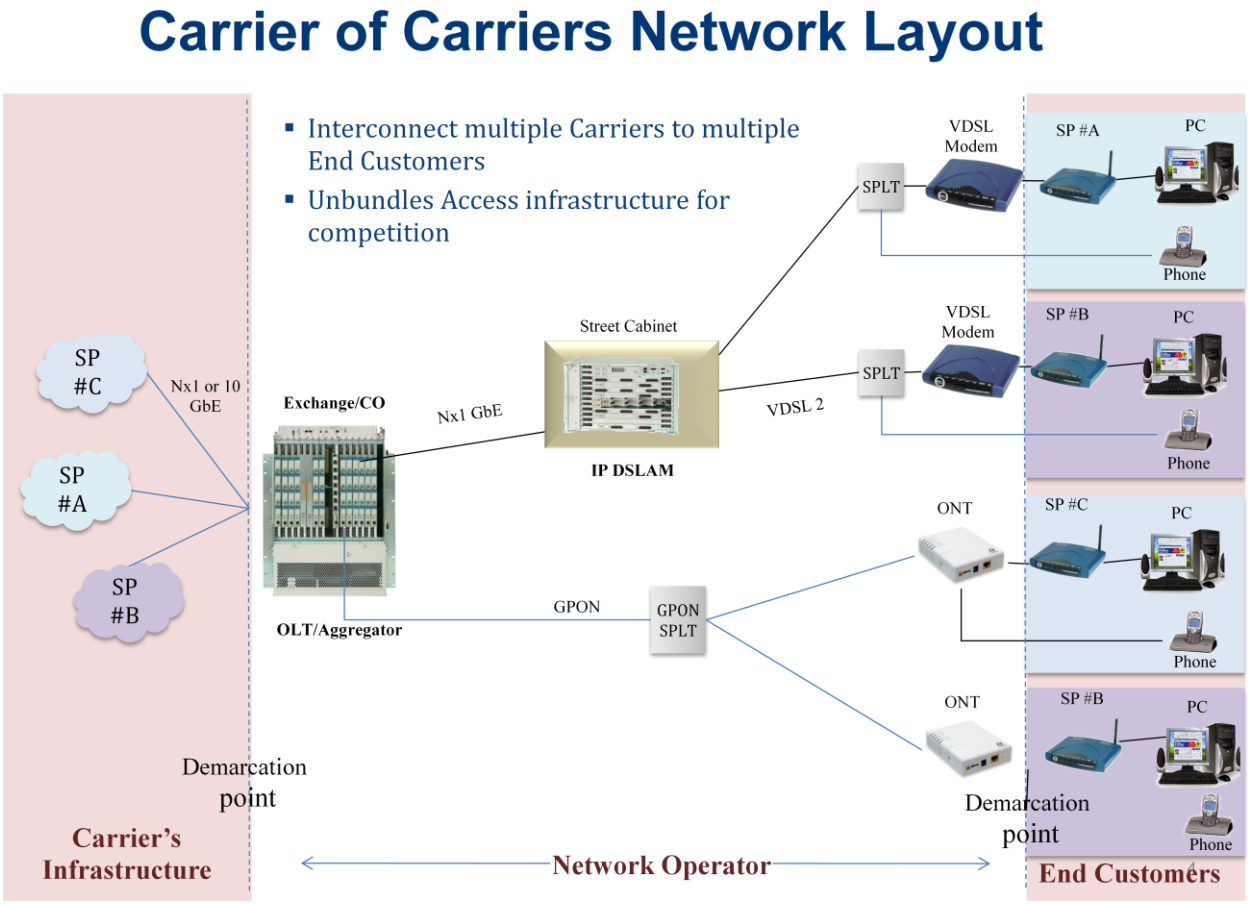
- Network Operator can offer a business model where the competitive Service Providers on one hand need not invest in their own Access Infrastructure, yet have control and an understanding of their service performance.
- The model lends itself to voluntary cooperation between competing service providers and provides an equal starting point for all wireline Service Providers.
- Controlled QoS means managed agreements between Network Operator and Service Providers.
- Model implements a logical separation of services end users and Service Providers on the common access infrastructure using virtual identifiers (e.g. VLSANs, Pseudo Wire, etc.) with an advanced fairness (predefined and managed) mechanism of using resources.

B) Same platform – PON and VDSL support:

Access infrastructure enables FTTC (VDSL) and FTTP (GPON) service offering according to need.

Business implications:

- Better ROI on Access infrastructure with CAPEX savings due to the lower cost of aggregation boxes.
- OPEX savings are gained due to a unified OLT platform, and thus a lower number of network elements. This means lower ongoing operational and maintenance costs
- End to end management has a direct effect on the OPEX and ease of operation.



Category: Deployment and Operations

Category: Deployment and Operations

Company: Swisscom/Plumettaz (Switzerland)

Innovation: FttH Robot

Winner: Swisscom/Plumettaz – FttH Robot

Abstract (500 words)

When the existing underground duct networks can be used for the installation of FTTH a lot of (digging) costs can be saved. In Switzerland (Swisscom), in the drop area, most houses are connected by copper cables installed in steel ducts. These ducts (Zorés 2) can be as small as 40 mm diameter and are laid in configuration of a trunk (street) with T-junctions to the homes. In these ducts there is some place left for optical cables. Preferably, the individual cables are installed each directly to the homes, without making (expensive) workholes at the T-junctions. However, traditional pulling of the cables over the copper wires requires at least digging work holes at each T-junction.

In order to overcome above mentioned problems, Swisscom and Plumettaz jointly developed a unique and innovative FTTH robot. This robot consists of a mechanically pushed rodder, its head containing a camera and a flexible, steerable (bending and rotating) arm, the fibre snake. The system is electronically controlled such that obstacles in the duct can be passed. Sometimes even T-junctions can be passed directly. When the latter is not successful immediately, it is possible to push in another rodder, from the home, which is hooked (again electronically controlled) on the first rodder. When the rodder has been installed the cable can be pulled in. The system is very small in size, uses impact resistant mechanics and intelligent electronics controls. Its design, the control and the mechanical methods are protected by 2 patents.

The FTTH robot reduces the underground engineering work and costs associated with it by over 50%. Fewer streets, walkways and gardens have to be opened up, which results in less disturbance to inhabitants (noise, dust and construction inconvenience) and street traffic (closing streets and parking lots), thus improving customer satisfaction. The FTTH robot reduces costs and accelerates FTTH expansion in Switzerland. It can also be used in networks in many other countries, optionally modifying (e.g. dimensions) the technique a little.

Contact Person

Roland Baeriswyl

Management summary
FTTH Robot

- Swisscom is investing heavily in FTTH and in the efficiency improvement for the deployment.
- To be able to build more quickly and cost-efficiently, Swisscom teamed up with Plumettaz to develop a robot unlike any other in the world.
- It has a
  - very small size (for Zorés 2, ø40mm)
  - impact-resistant mechanics (>100kg)
  - intelligent electronic controls

- Depending on local context, the FTTH robot can reduce the underground engineering work and the costs associated with it up to over 50%.
- Long-lasting construction: Fewer streets, walkways, and gardens have to be opened up, which results in less disturbance to inhabitants and street traffic, thus improving Customer satisfaction.

swisscom

Why Swisscom is investing in developing a unique robot to lay FTTH

- Swisscom is deploying FTTH nationwide
- In the drop area, Swisscom is forced to dig many work holes in order to lay optical fiber cables in existing underground ducts
- The idea of the FTTH robot is to avoid digging these work holes

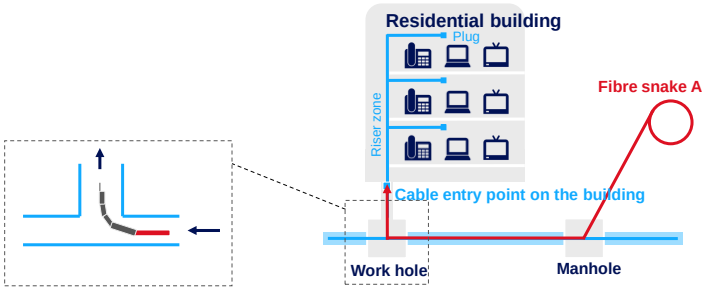
existing underground ducts

work holes

swisscom

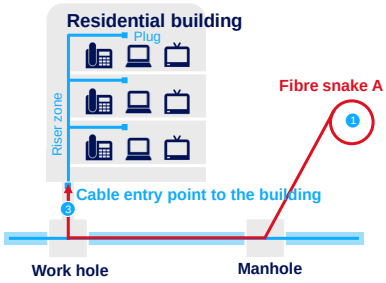
Method 1:The FTTH robot enables the passing of T and L junctions in existing underground duct systems

- From an open manhole, the robot is placed in the Zorés channels by hand and steered through the T and L junctions (work hole), until it reaches the cable entry point for the building.

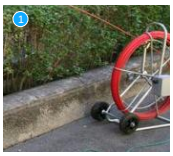


swisscom

The robot system consists of 3 elements:
reel with fiber snake, control box, and flexible robot head



1. Wheel with fibre snake
2. Control box
3. Flexible robot head



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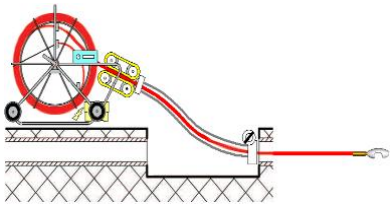
Fibre snake and control box



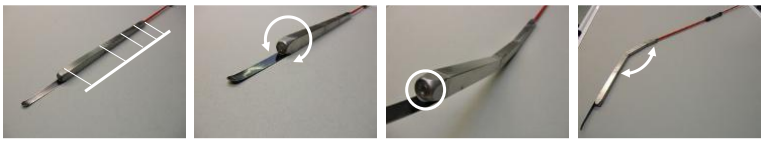
❶ Fibre snake
Option 1: 100m
Option 2: 150m
Option 3: pusher

❷ Control box

swisscom

Special features of the robot

- Flexible robot head
- very small size,
- impact-resistant mechanics
- intelligent electronic controls
- 2 patents protect the design, the control, and the mechanical methods for inserting fibre optics without underground engineering work

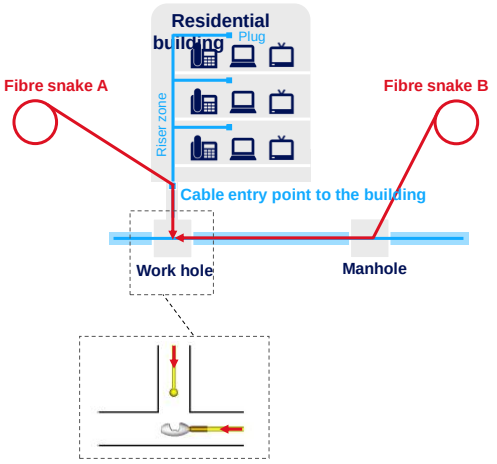


4 flexible segments | ø20mm | micro-camera with 6 LEDs | 85° tilt angle

swisscom

Method 2: Meeting System

The robot is also designed as a meeting system



1. Meeting head
2. Steering head with camera

swisscom

Sustainable improvement of the fibre optic network

- Massive reduction of up to over 50% in underground engineering work beneath the streets
- Less noise, dust, and construction inconvenience for local residents, as fewer streets, pavements, and gardens have to be dug up.
- Fewer streets and parking lots must be closed, resulting in less disruption of traffic.
- The FTTH robot reduces costs and accelerates FTTH expansion in Switzerland.

swisscom

Category: Deployment and Operations

Company: Alcatel-Lucent (UK)

Innovation: Fiber Network Management

Alcatel-Lucent – Fiber Network Management

The Market Need

The market for high-speed services enabled by lightning fast fiber optic networks has so far, outpaced the supply. Service providers have made huge strides in laying fiber networks, but manual service activation, diagnostic and support processes are driving up costs and delaying much-needed return on investment. To turn the tide of escalating costs, providers need automated, remote network management capabilities that allow them to rapidly scale services without putting the customer experience at risk and achieve the economies of scale.

Alcatel-Lucent's Innovation

As service providers look for ways to scale their fiber deployments to meet the exploding demand for high-bandwidth services, a more sophisticated and automated approach – one that delivers better operational efficiencies and enhances the customer experience – is necessary.

In addition, service providers must not fall into the trap of focusing on line quality alone and need to take a more end-to-end view of service delivery and customer care. Self-service activation and remote service management are key factors in scaling broadband services to a larger market.

Providers need the ability to automate and remotely manage fiber network operations at three key stages of the customer lifecycle: service activation, support and proactive maintenance.

To address these service provider needs, Alcatel-Lucent has developed the first of its kind – fiber line management - into its Network Analyzer product. This innovative technology, announced late in 2009, provides maximum reliability for fiber networks and remote management that enables proactive detection of fiber and equipment degradations and failures. It includes troubleshooting capabilities for customer care, operations and field force, by providing the most advanced reports and analysis tools for each level. Vendor agnostic, it provides quality-of-service management capabilities for optical networks powered by either Alcatel-Lucent or any other network infrastructure provider.

Fiber access management is an art. As fiber networks grow, the need for remote network management tools become critical to ensuring a high quality of service for the end-user customer. Alcatel-Lucent's proactive approach secures the evolution and future growth of service provider's fiber networks. The simplicity of Alcatel-Lucent's innovation provides a smooth service activition path (key to customer retention) that is cost effective to providing an end to end test method that avoids capital investment.

Alcatel-Lucent's approach enables providers to accelerate time to market, reduce operating expenses and maximize their capital investments. The ultimate prize, of course, is long-term customer loyalty.

Category: Deployment and Operations

Company: Draka (Netherlands)

Innovation: The Draka SmartDraw^{XS} Deployment Technique

The Draka SmartDrawXS Deployment Technique

Concept, implementation, and benefits

Contents

The SmartDraw^{XS} Concept

The big picture

The SmartDraw^{XS} deployment technique is a unique concept that led to the creation of several “industry-changing” solutions. The predominant benefit of this remarkable innovation can be seen in its technical advancements over existing methods and, most importantly, in the manner in which it strengthens the FTTx business case by reducing the total cost of ownership (TCO).

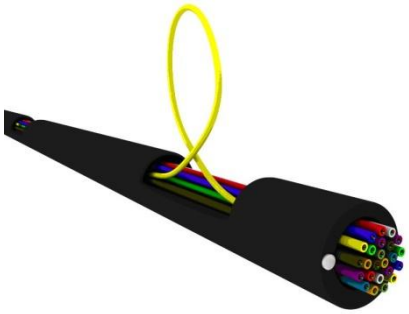
The underlying concept revolves around using a specialty cable as the core of the operation. This cable is filled with loose fiber modules that are designed to have low friction properties. At the same time, window-cuts can be made at multiple points along the cable length, so allowing individual fiber modules to be cut and pulled back to one of those earlier window-cuts. These fiber modules can then be pushed or blown through separate microducts to reach a termination or distribution point (typically on the customer premises). Draka has developed solutions for both indoor and outdoor use of the SmartDraw^{XS} Technique. These solutions utilize the advantages of BendBright^{XS}, Draka’s new generation bend insensitive fibers. These offer a number of beneficial opportunities: the use of compacter and more flexible fiber optic cables; the deployment of customized connectivity Tapping Boxes; and the development of specialized tooling systems that further increase efficiency and reliability within Draka’s newest FTTx deployments.

How the concept works

The starting point for this Technique is Draka’s BendBright^{XS} fibers. These fibers encompass all the features of Enhanced Single-Mode ESMF fiber and provide high resistance to additional losses due to macro and micro-bending, particularly in the 1600 nm wavelength region. This means that these fibers have the flexibility to be pushed, pulled, bent, branched, and handled in ways that allow easy manipulation for installation, without reductions in loss or damage to the fiber core.

Retractable cables

Utilizing the advantages of BendBright^{XS} fibers, Draka has developed a series of specialty cables that contain retractable fiber modules. These modules act almost as miniature cables inside a duct. They are soft enough to be flexible and easy to handle, while at the same time being stiff enough to retract long distances within the cable and be pushed or blown through small microducts as well.

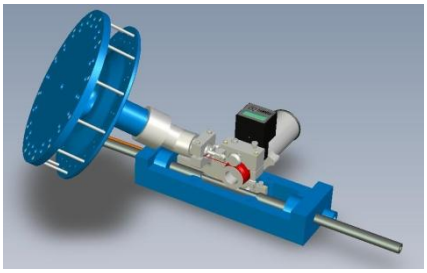


Tapping Box

For shielding the cable and branching of the fiber modules, the RetractaNet^{XS} Tapping Box has been designed. Anytime a cable is opened with a window-cut, it is exposed to potential interference from outside elements – hence the use of a Tapping Box to protect the opening. The Tapping Box serves multiple purposes, however, beyond protecting the open cable. It must be suitably water and/or gas tight to prevent the cable from becoming a conduit for dangerous elements, and – its most important function – it must create a safe and efficient means to branch the retracted module towards its final destination. There needs to be an appropriate number of ports for this branching while maintaining full compatibility with the protective duct into which the fiber modules will be pushed.

Eliminating human error

The final piece of the puzzle is one that truly helps define the advantages of this deployment technique. The SmartDraw^{XS} Tool removes human error, reduces any possible damage to the fibers, reduces the labor hours required for installation, and greatly increases the possible pulling and pushing distances that can be achieved. The tool can be used in very small spaces, which makes it suitable for indoor or outdoor use, and it neatly stores the retracted fiber modules to ensure a very clean and organized work area.



Implementing SmartDraw^{XS}

As mentioned, Draka's SmartDraw^{XS} Technique employs specially manufactured retractable cables for use in indoor and outside plant applications. This deliberate re-purposing and re-use based on the adaptation and customization of a shared technological concept delivers cost, reliability, speed, handling, ease-of-use and other benefits in both indoor and outside plant networks.

Draka RiserNet^{XS}

Draka's RiserNet^{XS} version of the SmartDraw^{XS} Technique uses specially manufactured retractable riser cables that run (rise) from the indoor distribution box at the building entry point, straight up to the top floor. These unique riser cables are filled with smaller optical modules – a fiber unit or bundle of fibers – that are intended to be cut on a higher floor (up to 20 meters away) and then retracted so they emerge on a lower one. From there, you can run them into the customer's premises or splice to an indoor drop cable.

RiserNet^{XS} provides an efficient method for deployment on each floor. This in turn means that in many configurations it can be used to reduce skilled-labor costs and save time during installation. Taking things a step further, RiserNet^{XS} riser cables can even be supplied pre-connectorized, for one-stop connection at the indoor distribution box.

Draka's RiserNet^{XS} Tapping box is a re-enterable indoor closure that is part of the RiserNet^{XS} Solution. A compact, fitted, and gas tight closure, it is used for branching fiber modules on any floor of an MDU to feed the customer outlet box. With interchangeable inserts for various diameters and six ports for branching, the RiserNet^{XS} Tapping box is compatible with all Draka Riser Cables and has been customized for use with the SmartDraw^{XS} Tool.

Draka RetractaNet^{XS}

The RetractaNet^{XS} Solution for OSP applications reflects Draka's continued commitment to bringing new technologies, concepts, and innovation to the FTTH marketplace.

This direct buried outdoor solution uses a retractable cable (RetractaCable) that is run from the Optical Distribution Point through trenches. This Direct Buried Cable is filled with fiber modules that are designed to be cut at one point of the network and pulled back to a place where they can be then pushed or blown through microducts, directly to the customer premises.

Frequently, RetractaNet^{XS} is used in an existing duct or sub-duct infrastructure, where window-cuts can easily be made at handholes or manholes. There are many other specific techniques that can be deployed for this solution, depending on the layout of the network and the set-up of the customer premises. The most predominant benefit of using this special solution lies in the simplicity of the concept and the consequent reduction of skilled labor needed to accomplish the work. It is ideal for existing neighborhoods (Overbuild scenarios), but also very efficient for Greenfield deployments.

Draka's RetractaNet^{XS} Tapping Box is a re-enterable direct buried OSP closure that is part of the RetractaNet^{XS} Solution. A heavy duty, watertight closure, it is ideal for protecting and branching retracted fiber modules within a distribution or drop portion of the network. The RetractaNet^{XS} Tapping box can also be used to repair damaged fibers and has been customized for use with the SmartDraw^{XS} Tool.

The SmartDraw^{XS} Tool

As the development of the SmartDraw^{XS} Technique progressed, Draka realized that the effectiveness of this deployment method would be substantially increased if human handling errors could be eliminated. This led to the development of the SmartDraw^{XS} tool or DomoJet® with Plumettaz SA, a long-standing co-development partner of Draka and a specialist in cable-laying, cable jetting, and micro-cabling equipment.

The result of this combination is a tool that takes full account of the applicable installation procedures. The cable design, the design of the tool and the way it interacts with the fiber modules have been aligned so that the tool leverages the advantages of Draka's BendBright^{XS} bend insensitive fibers in the way it grabs and stores the modules. The tool works perfectly with Draka's customized tapping boxes, whether placed in a trench, handhole, basement of a building, or a narrow riser shaft in a MDU.

Benefits of Tool vs. manual process

Without the SmartDraw^{XS} Tool, the process for deploying the RetractaNet^{XS} Technique requires at least three operators. This equates to many manual labor hours for what is a relatively simple operation. At the same time, depending on the system used by the workers, the process of retracting and storing 100+ meters of fiber modules can become rather messy, or untidy. The pulling and pushing of the fiber modules also risks breaking the fiber if the pulling force exerted on the module is not consistently accurate. This pulling force actually needs to be quite high and is a challenge to perform by hand.

Once the retracted fiber is ready to be fed through the branching duct, a whole new challenge arises. Working manually, the modules cannot be pushed very far without them becoming stuck. An alternative is to use a duct with a pre-installed pull cord. This of course increases the cost of the duct and provides a whole new host of potential issues. First, it is very time consuming and brings with it a very high risk of kinking in the fiber module. Second, if a break occurs, it is difficult to resolve. Splicing is an option, of course, but then there are new challenges with safely storing the splice and then being able to push or pull the new cable to the final destination. Third, this process increases the demands for and placed on manpower.

The SmartDraw^{XS} Tool features three main functionalities that help to overcome the issues of a manual installation listed above:

1. Pulling (retracting) the modules from within the retractable cable;
2. Storing the retracted length of module in a storage container in the SmartDraw^{XS} Tool;
3. Pushing and/or blowing the stored length of module into the branch duct to the customer premises.

How the SmartDraw^{XS} tool works

Looking at an OSP application first, the SmartDraw^{XS} tool attaches securely to the customized RetractaNet^{XS} Tapping Box, from where the fiber module can be safely threaded through the tool. Once the retraction begins, the Tool ensures smooth operation by applying a continuous steady pulling force of up to 15N to the cut fiber module. For Outdoor use, the tool can fit into a space of 30x50 cm, making it easy to use in a handhole or trench. As the pulling function takes place, a small LED screen gives the user the ability to track the length that has been retracted. As the fiber module is pulled back into the tool, it is neatly and safely reeled into the storage container.

The last function of the SmartDraw^{XS} Tool is to push the retracted fiber modules into a microduct that runs to the customer premises. Once the fiber module has been fully retracted into the storage container, the end of the module can be manually fed through the tool's pushing "gear" and into the microduct. The tool is then set to "push mode" and begins pushing the module through the microduct. In some cases, when further distances must be bridged, an optional compressed air hose can be connected to the tool and the module can be "jetted" or blown to its final destination.

The SmartDraw^{XS} Tool works just as previously described when being used indoors with RiserNet^{XS}. It is designed to fit in an even smaller working space of 15x15 cm as can be expected when working indoors. All standard features and applications of the tool apply to RiserNet^{XS} in the same manner as they apply to RetractaNet^{XS}.

Modeling

The SmartDraw^{XS} Technique used in the RetractaNet^{XS} Solution was originally developed for use in the man-accessible sewers of Paris. The efficient technique that emerged has since been adapted and the products involved tailored for use in duct and and/or direct buried scenarios. As a result, the SmartDraw^{XS} technique has been widely used on indoor deployments (RiserNet^{XS}) while the process of assembling case studies for involving OSP deployments (RetractaNet^{XS}) is still in its early phases. However, there is a way to figure out if a new deployment method is efficient – use Network Modeling to compare the new solution to other solutions.

Extensive modeling has been done on RetractaNet^{XS} to show its ability to reduce labor costs as compared to traditional microduct or direct buried cable solutions. Looking at the chart in Figure 1, which compares the RetractaNet^{XS} Solution to a Direct Buried Cables Solution and a Microduct Solution, the cost savings in the OSP drop can clearly be seen in a typical FTTH rollout of 50,000 homes. This chart reflects costs associated only with the drop portion of an OSP network.

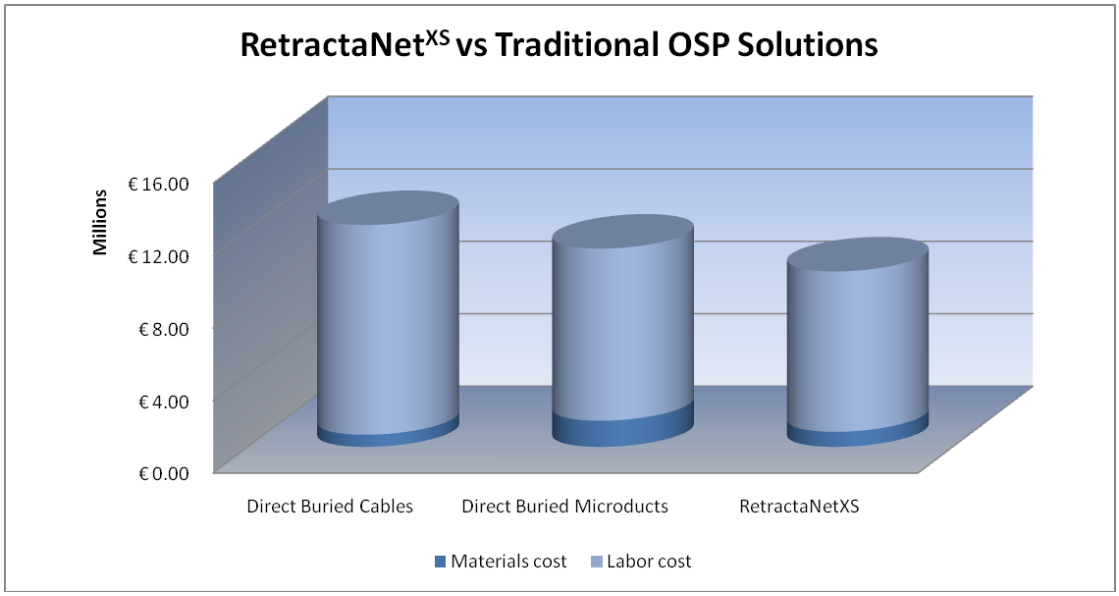


Figure 1

A striking fact that comes to light when comparing the RetractaNet^{XS} Solution to other OSP solutions is that there can be an increase in material costs by up to 24%. Conversely, there is a decrease in labor costs by up to 24% as well. Since labor costs clearly outweigh the cost of materials, the total advantage of RetractaNet^{XS} in the drop portion of the network equates to a 10-20% cost reduction over its counterparts. This translates to anywhere from 25 to 55 Euros per connection.

Similar results become evident when modeling the RiserNet^{XS} solution in high rise buildings. A comparison is done with two other types of indoor installations; an indoor microduct solution and an indoor drop cable solution. As can be seen in Figure 2, RiserNet^{XS} offers significant cost savings for the indoor fiber network.

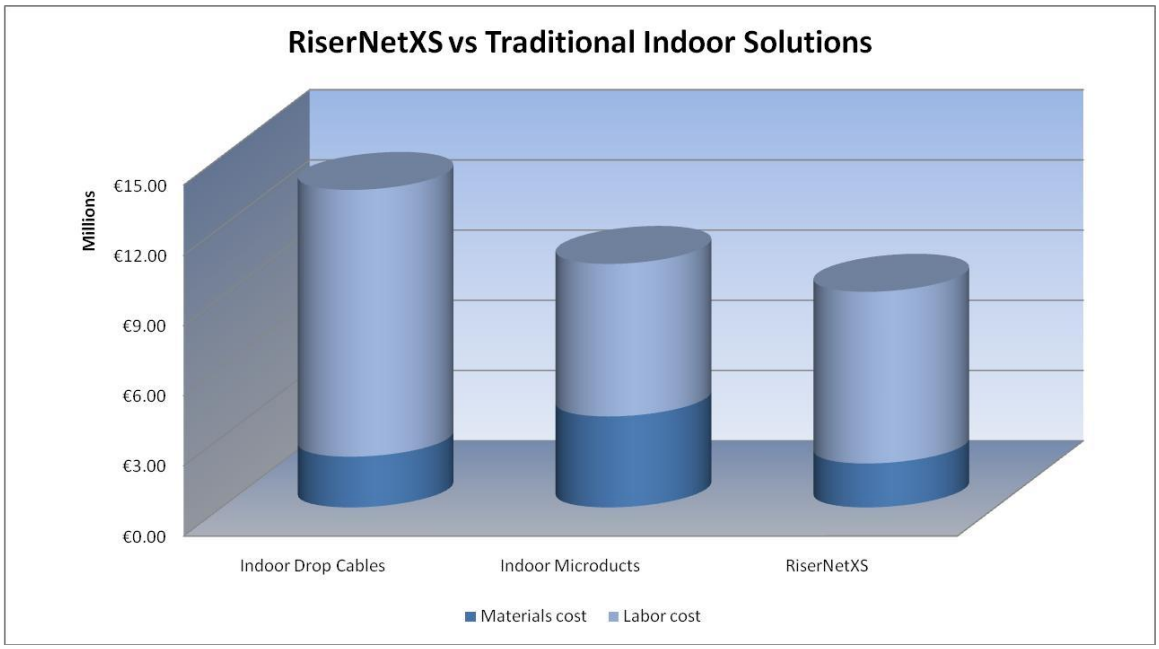


Figure 2

It is important to note that RiserNet^{XS} should not be judged based on modeling alone – there are numerous past and present indoor deployments that are a testament to the efficiency of this network solution.

Expected market impact

An extensive business case has been done on the SmartDraw^{XS} Technique, but to fully understand where and why it will be deployed, it must be viewed in context of the different ways it will be used. First, there is the RiserNet^{XS} Solution, which is ideal for mid to high rise MDUs as well as medium and large office buildings. The demand for RiserNet^{XS} deployments can already be felt throughout Central and Western Europe. It is an established indoor solution that is already planned for new buildings in the Middle East over the next several years.

A separate business case must be made for the RetractaNet^{XS} Solution for Outside Plant installations, but a single case study alone is insufficient. The solution must be further broken down into its constituent parts. The RetractaNet^{XS} Solution can be deployed in three different ways: direct buried; placed in a duct or existing Right of Way; or deployed in a Greenfield Build. Because each of these deployment types is very different, and further varies according to country and regional customs, each requires its own business case.

Countries that will benefit

As a direct buried solution, RetractaNet^{XS} makes sense when the soil is soft and easy to dig, such as in Germany, The Netherlands, Belgium and Poland.

In cases where the soil prevents the use of a direct buried approach, the RetractaNet^{XS} Solution can be used inside an existing duct infrastructure or other Right of Way, such as sewers and tunnels, with the tapping boxes allowing for easy entry and re-entry at the installer's convenience. This type of existing infrastructure is common in many European countries, including France, Spain, Portugal, Italy, Greece, Scandinavia, the UK and Ireland.

Finally, the deployment of RetractaNet^{XS} in Greenfield builds is also a very efficient and successful way to use the SmartDraw^{XS} technique because in these situations it is very easy to dig trenches and leave them open for the installers to do their job at their convenience. Such Greenfield builds that will benefit from RetractaNet^{XS} are located in regions such as The Middle East.

Value innovation

A breakthrough in TCO reduction

The clear benefit of the SmartDraw^{XS} innovation lies in its achievements in reducing the Total Cost of Ownership of an Access Network. In this way, it helps to undermine and remove many of the arguments typically made against fiber deployment.

In addition, the Technique further exposes an important truth about the balance of material and labor costs, as shown in Figure 3. Since labor costs related to installation are such a dominating factor within the Total Cost of Ownership, designing the right products, *even at an increased material cost*, can reduce the labor requirement to such an extent that the end, net result is a clear and significant benefit to the bottom line.

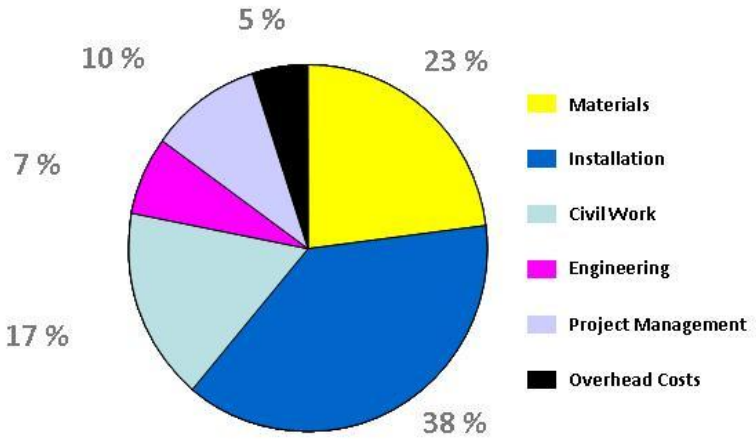


Figure 3

Category: Deployment and Operations

Company: Genexis (Netherlands)

Innovation: The modular fiber termination unit

Genexis – Modular fiber termination unit

Abstract:

When the first fiber-to-the-home projects started in Europe, there was a large gap between the suppliers of the passive fiber infrastructure and the vendors of the active equipment that delivered the services. The fiber cable simply entered the home and was terminated with a connector in a box. By joining of the active and passive networks a breakthrough could be made. Combining the fiber termination unit in a modular way with the active CPE enabled two major things: ease of installation, and a clear demarcation point between the active and passive network. Today, this concept has been adopted by most CPE vendors active in Europe. In this way, it is paving the way to standardization in how FTTH networks are built, and opening the market to healthy competition and cooperation in the industry.

Text:

When the first fiber-to-the-home projects started in Europe, there was a large gap between the suppliers of the passive fiber infrastructure and the vendors of the active equipment that delivered the services. The fiber cable simply entered the home and was terminated with a connector in a box. The fiber gateway or CPE was typically a DSL “look-alike” module with an optical input port where the DSL port would normally be. Passive and active networks were joined by patching a fiber cable between the optical connector and the CPE.

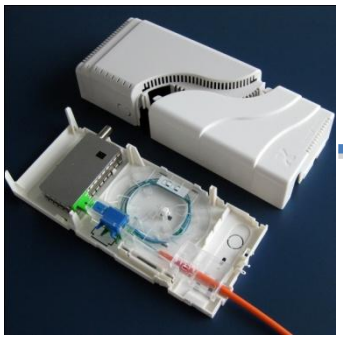
Today, most CPE vendors have an integrated fiber management to store and protect the fiber cable. In addition, the fiber management and active CPE parts are often modular, enabling deployment of the passive part first, and connection of the active CPE later, e.g. when the end-user signs up for a subscription. The build-up of the CPE in two parts – fiber termination and active CPE – thereby reduces considerably the installation cost and at the same time reduces the risk of the end-user damaging the fiber.

This joining of the active and passive networks was initiated by a team at Genexis who saw this need in the early FTTH project in the Netherlands. The team realized that the deployment of fiber to the home is fundamentally different than DSL or coax networks. The aspect of fiber means higher installation cost and the introduction of a fragile medium in the home. At the same time fiber offers the opportunity of much lower operational cost. The key was to develop a home CPE that protects the fiber and enables easy installation. To achieve this Genexis combined the fiber termination and active CPE in one modular unit. The modular build-up enabled placement of the fiber termination first and connection of the active CPE later. Based on this concept companies like Reggefiber and KPN have started large-scale deployment of FTTH networks.

While Genexis’ concept in itself is a technical innovation, the consequences have important operational and even financial implications. For instance in the case of Reggefiber, the focus is on building a fiber-infrastructure that has a long-term value. Because of Genexis’ modular build-up, the cost of installation decreased very strongly and at the same time the interface between passive and active network was well-defined. This is key from an investor point-of-view, since it clearly defines the handover from passive to active network and hence protects the value of the fiber network.

The simple concept of a modular CPE has now been adopted by most CPE vendors active in Europe. In this way it is paving the way to standardization in how FTTH networks are built, and opening the market to healthy competition and cooperation in the industry.

Installing the CPE into the home in 3 simple steps.



(1) First step is a simple but perfect finishing of the fiber with a fiber termination unit (FTU) and blind cover.

(2) Second step: Give your customer the service that he requires by clicking the active CPE on the FTU, press the slider with one simple movement into the fiber slot of the active CPE.

(3) Last step: Click the lower-cover onto the FTU, power up and experience the services you requested.

Category: Deployment and Operations

Company: Tallgrass (Netherlands)

Innovation: Colour to the Home

Tallgrass – Colour to the Home

Color to the Home

Increasing the take rate in PON

a CWDM PON design allowing multiple providers on an open access network

a design by Tallgrass

Authors: Reindert Hommes, Michael Scharn, December 2009

PREFACE

This document was created for the Innovation Awards 2010 - "Enlighten the Next Decade" that was issued by the FttH Council Europe. We have taken great care in putting this document together. It reflects our view of FttH and the use of state of the art - but proven! - technology.

Acknowledgements

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About the authors

Reindert Hommes has worked in various IT environments, including: Healthcare, Database Design, Content Management. With a master's degree in computer science he is able to bridge the gap between technology, commerce and organisation. Especially estimating impact and feasablity of projects is one of his strong points. Together with Michael Scharn, he is the founder of the Tallgrass Cooperative.

Michael Scharn has extensive experience as an IT Architect for ,amongst others, large datacenters, complex organisations and ISP's. With a broad knowledge of networks he is able to quickly apply the best available solutions. This allows an organisation to choose from best of breed technology. His commercial qualities alllow companies to instantly see the added value.

About Tallgrass

Tallgrass is a startup company founded in 2009 that focusses on optical transport. Tallgrass delivers concepts and realisation to enterprise businesses interested in optical transport. This includes dark fiber, active and passive components, METRO designs, training and measurements. Tallgrass is currently not funded other than by revenue.

Keywords: Next generation networks, FttH, CWDM, ROI, Provisioning, Open Access, CAPEX, OPEX

INTRODUCTION

Current FttH deployment in Europe (and other parts of the world) struggle with the same challenges: reduce Total Cost of Ownership (TCO) and increase the take rate (The % of users connected to the available infrastructure). A lower TCO and a higher take rate will lead to a quicker Return On Investment (ROI) that will increase the chance of success and therefore will be more attractive to investors.

The cost and take rate are influenced at an early stage in FttH projects, often at the design level: do we deploy point-to-point or point-to-multipoint - or PON? How about provisioning? Is this solution scalable and future proof? What are the support levels?

In this proposal, we provide a way to quicken the Return On Investment by lowering the TCO and by increasing the take rate. The lower TCO involves a design using CWDM techniques and an independent operator to create a true open access network[1]. This allows more service providers on the network at a lower initial cost. This will then increase the chances of success at higher take rates.

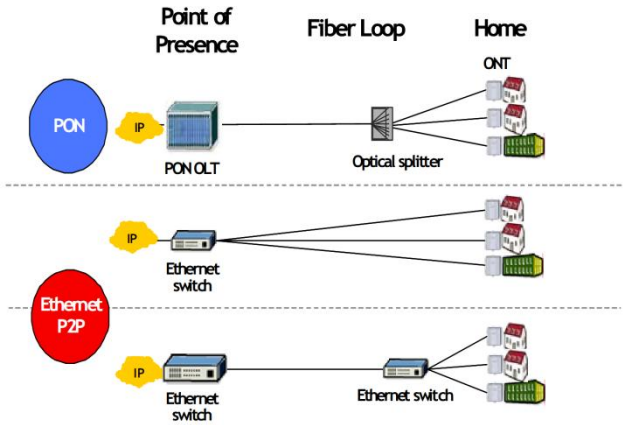
1. INCREASED TAKE RATE

Our goal is to increase the percentage of households connected to the available infrastructure. We feel this can be achieved by increasing the number of Service Providers that have access to the FttH network and by shortening the lead time for Return On Investment so lower subscription fees can be charged to the end-customer, thereby competing with current broadband access offerings such as DSL. We will first look at current FttH deployment options as well as propose a CWDM solution. Then we will emphasize the need for an open access network. Finally, we will look at the financial consequences.

2. SOLUTIONS FOR FTTH

Fiber is not always delivered into the home, but sometimes to the node, curb or building[2]. In this paper we will not look into other options than fiber directly delivered to the home. The current choice for a FttH roll-out is either Point-to-Point (P2P) or Point-to-Multipoint (P2MP, also referred to as PON)[1]. In P2P networks, Ethernet is often used as transport protocol as defined by IEEE 802.3[3]. In P2MP networks the model most often used is GPON[4] as defined by the ITU or EPON[3] as defined by the IEEE. A more recent choice of PON is by applying Multiplexing, either by Time Division Multiplexing (TDM)[4] or by Wavelength Division Multiplexing (WDM). We will discuss WDM as a good choice for FttH deployment.

2.1 Point to Point



Picture 1: Source: FttH Council Europe

Current FttH topologies often describe the centralized office but also the use of branched offices is common. Especially in Point to Point topologies, the use of Area POPs (AP) is necessary in order to keep the number of feeder cables as low as possible so maintenance is still possible. From the APs, direct buried cables are used to connect every single home directly to the AP. This AP is then populated with active equipment to ensure the data is transported to the Centralized Office, also called City POP (CP). The deployment of this active equipment in a limited space of an AP (typically 15m²) makes it impossible to allow more than three Service Providers in the network. An AP can only provide room for three

19” cabinets that are rented out to the Service Providers. The rest of the space is occupied by Optical Distribution Frames (ODFs) and other active equipment (aircos, UPS).

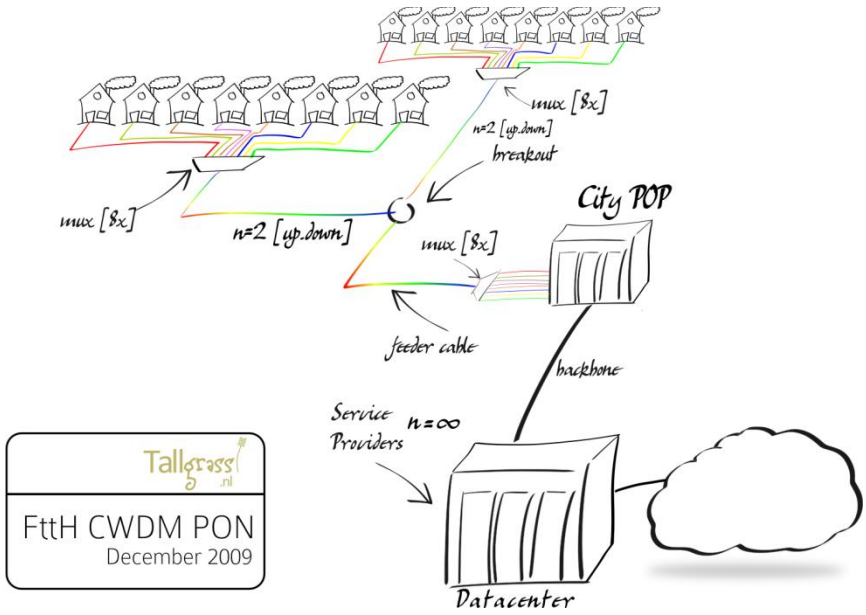
2.2 Point to Multipoint - or PON

A very popular alternative to Point to Point infrastructure is the use of Point to Multipoint solution. When deploying Point to Multipoint, active equipment is only used in the centralized office and at the customer (Customer Premises Equipment - CPE). Therefore it is also called Passive Optical Network (PON). For convenience we will refer to Point to Multipoint networks as PON from now on. PON has many flavours: GPON, EPON, WDM PON. Time Domain Multiplexing is often used but this faces technological challenges with rates higher than 10Gbit/s [5]. WDM PON is the likely candidate for future FttH deployments [6]. Colourless Optical Network Units (ONU) are used in WDP PON today. Because of the deployment characteristics and the large number and dynamics of channels, coloured ONUs present operational challenges. However, colourless ONUs are a challenge in technical terms. When using injection locking, Signal to Noise Ratio becomes a problem [7][5]. Other problems are: coherency of the upstream signal, back reflection and insufficient locking [5]. We will now propose a CWDM solution for FttH.

2.3 CWDM PON

Current WDM PON solutions use Dense Wavelength Division Multiplexing (DWDM). This has a disadvantage over Coarse WDM(CWDM): the cost of lasers. DWDM lasers have to be cooled to maintain a wavelength variance of 50 or 100GHz. CWDM lasers have a much wider variance (20 nm) that is influenced by temperature (±6,5nm).

By applying WDM to FttH architecture, the best of both worlds of P2P and PON is combined[1]. The more secure and scalable point to point connection is realized by applying multiple wavelengths in one fiber. We will describe every component in the design in order to appreciate the completeness of our proposal.



Picture 2. CWDM PON by Tallgrass

2.4 The Centralized Office or City POP

The City POP is filled with 19” racks. There are two types of racks: the racks that connect the cable from the ground to a connector (these are called Optical Distribution Frames, or ODFs) and the racks that put a signal on the fibers using (in our case) Ethernet. The ODF is traditionally equipped with much space for lengthy patch cables. In our proposal, the City POP is managed by an independent operator. This means that also the access switches are managed by the operator. This allows the operator to dedicate patch cords to access switches, therefore no more lengthy patches are necessary. Also, once a patch has been made, it will only need changes in case of failure. The services to the customer are delivered at Ethernet level rather than Layer 1 of the OSI model (more about service provisioning and cost reduction in the next chapters). The other cabinets are filled with Ethernet switches witch 1Gbit ports and CWDM transceivers. Every port represents 1 of 8 different wavelengths and one customer. The rack also contains aggregation switches for connectivity to the backbone (i.e. Datacenter), where the Service Providers will connect.

2.5 CWDM Multiplexing

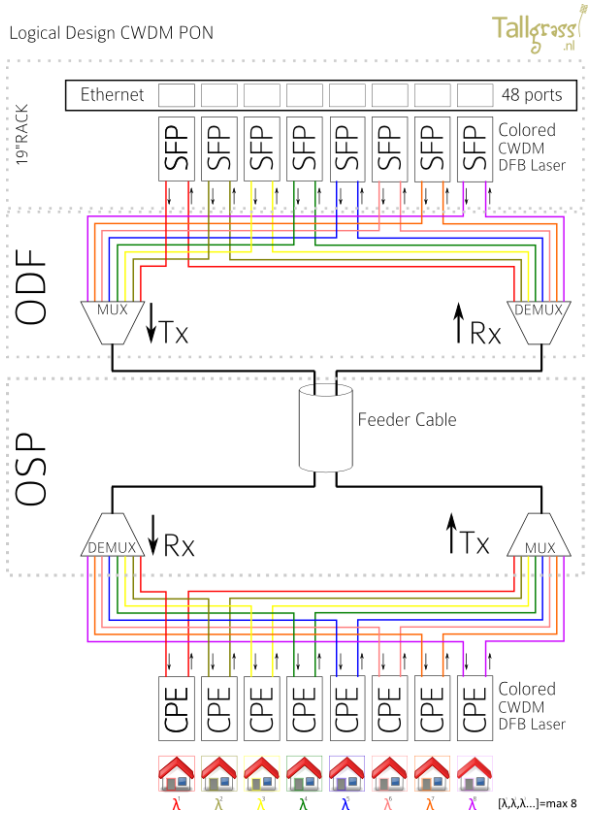
Each port is then connected to a multiplexer in the ODF, that combines 8 different wavelengths into 1 fiber. These multiplexers are small and fit easily into a splice box that goes in the ODF. Multiplexers can be based on various techniques, of which the most common are: Thin Film Filters and Arrayed Waveguide Grating [8][9][10]. The multiplexer in this proposal are based on Thin Film Filters since AWG multiplexers are not yet standardized for CWDM, although design and simulation results are promising [11]. The Thin Film Filters allow for a specific wavelength to pass through (filter) and the other to bounce back. The multiplexers are completely passive (no power required) and are part of the infrastructure. For incoming traffic (Rx) a demultiplexer is used that reverses the process and filters out 8 different channels from one fiber. These are then connected to the Rx port of the transceiver. CWDM multiplexers use a wide passband filter (>13nm) and a channel spacing of 20nm following ITU recommendation[12]. This is a trade off between cost and numbers. A CWDM laser is cheaper than a DWDM laser because of the wide channel spacing. A typical Distributed Feedback Laser (DFB) is sensitive to temperature. A change in temperature will cause a change in the measured Center Wavelength. Because DWDM has a very narrow channel spacing, lasers have to be cooled to operate at the right wavelength. This explains the difference in cost. However, DWDM allow for much more channels. Because cost is a major issue to FttH projects, this proposal uses CWDM channels. Up to 18 channels can be used. In this proposal only 8 channels are deployed to allow future expansion and easier deployment.

2.6. Fiber Optic Cable

Once connected in the ODF, the fiber will be bundled into a feeder cable. The feeder cable will be buried underground. At a given distance from the homes that will be connected, the fibers that are needed will be taken out of the feeder cable in a handhole. At this point, the multiplexers are spliced to the fiber and deployed to the homes. The multiplexers, again, are small enough to fit in a splice box. Two fibers for each connection into the basement or foundation where the fibers are connected to the CPE by the customer or by the customer services of the operator. All fibers are standardized Single Mode fibers (G.652).

2.7 Customer Premise Equipment (CPE)

The customer then connects his coloured CPE (only 8 variants possible) and he has a point to point ethernet connection, allowing multiple service providers to offer their content.



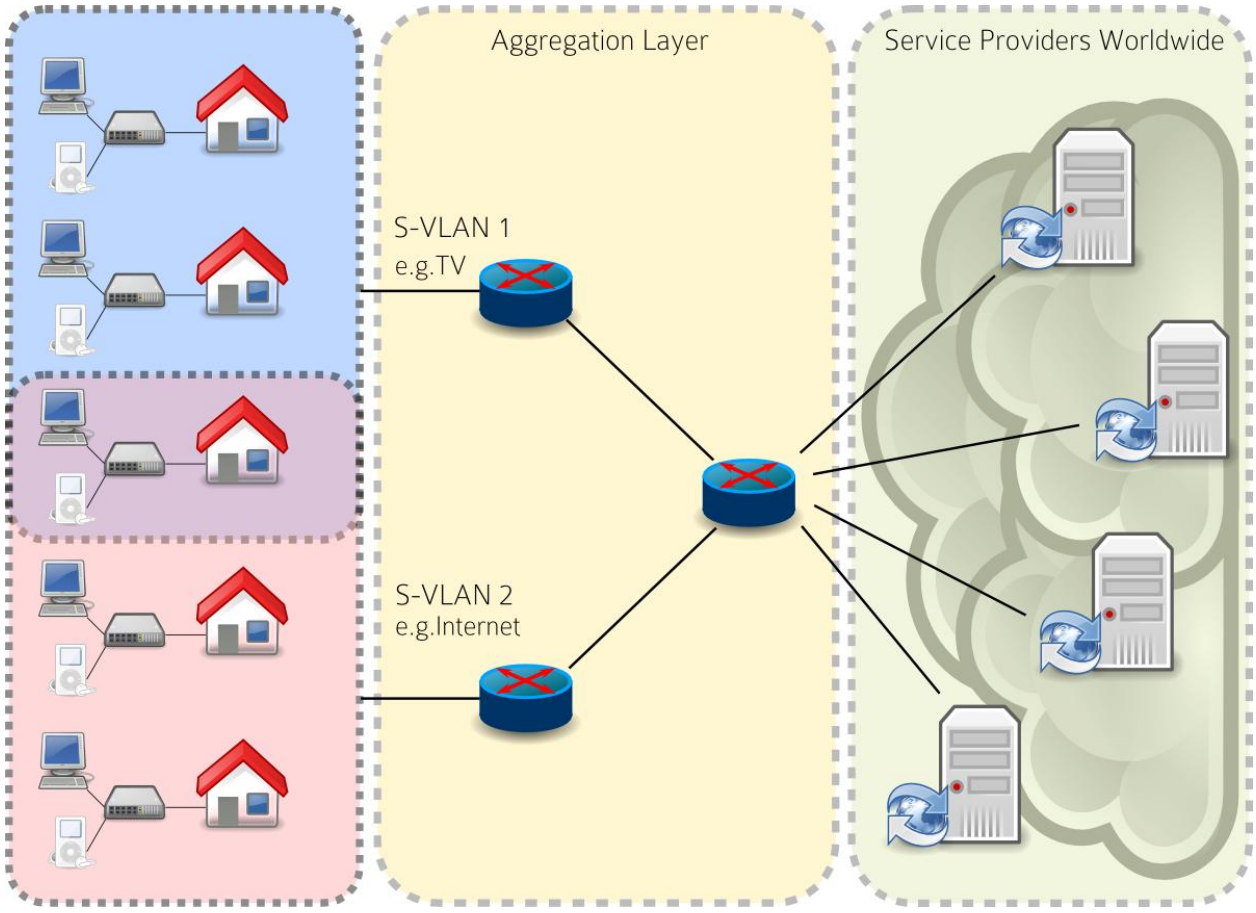
Picture 3. WOM PON design

2.8 The Math

For CWDM PON we use one City POP in the network to connect all homes in the area. The calculations are based on a number of nine thousand homes. One fiber pair is used per eight connections from the city pop to the distribution point near a group of endpoints (homes). The distribution point filters eight channels from the fiber pair and then per channel one fiber pair is brought to every endpoint (home). So we need two multiplexers per eight connections. In the City POP six times eight channels fit in one HU. This means forty eight ports per HU. A rack has forty two HU of which thirty eight HU are used for the connections. So per rack we have a total of 1824 connections. Per rack that has 1824 passive connections we need an equivalent of the same amount of active ports plus the aggregation / distribution of all the connections in the rack to the core network. Next to the passive rack we place an active rack that will provide forty eight ports per HU parallel to the passive connections. All connections have 1Gb Ethernet available as uplink speed. This is not dedicated because of backbone limitations. Therefore 200 Mbit/s dedicated upstream and downstream can be realized. Or 1Gbit/s overbooked 1:5. This is a marketing decision. Technical fact is that per rack two times 200Gbit/s is connected to the network core. Therefore only the dedicated bandwidth of 200Mbit/s Ethernet synchronous per connection will be realized. Calculations for this concept based on the numbers presented in this document can be made per passive and active rack pair. The cost breakdown per 1824 connections will not significantly increase or decrease when adding or removing connections. Our CWDM PON concept is calculated on a project enabling 9000 connections in a area. Per connection one CWDM channel is mapped dedicated to a home connection. To make the calculations simple we can work from the City pop. Here we have 4 2U 19”racks that in a PTP scenario are filled with 48-port ODF cassettes. We use the same principle. We use 8 channel CWDM muxes like we would use a splitter for PON.

3. OPEN ACCESS

The case for Open Access Networks has been made before. Even incumbents claim to have open access networks. Our proposal is slightly different to those open networks in a way that we offer a 'true' open access network. Service Providers connect at a virtual level, rather than investing in massive infrastructure to connect to the current open access network. Also, in our proposal there is no limit to the number of Service Providers connected, where current open access networks limit access to a maximum of three or four providers.



Picture 4. Open Access Network Design

3.1 Network Functionality

In order to allow service providers that do not have presence in either the POP or Datacenter, we propose the deployment of Virtual Local Area Networks (VLANs) as described by the IEEE standard 802.1Q[13]. This standard can support only 4K (four thousand) VLANs[14]. In Metro networks, the need to isolate and identify subscribers is much higher. For this, the Service VLAN (S-VLAN) is used. Multiple users share a VLAN that is dedicated to a service (e.g. TV from provider A).

3.2 Provisioning

The ATIS Telecom Glossary describes provisioning as: “In telecommunications, the setting in place and configuring of the hardware and software required to activate a telecommunications service for a customer.” Since the architecture leaves no room for multiple providers at the Ethernet Switch level, a neutral party should be commissioned to:

1. Provide End Users with hardware (CPE)
2. Provide End Users with software (GUI)
3. Connect End Users to access switches (Patches)
4. Connect Service Providers to POP (SVLAN)
5. Route Service Provider to End User (SVLAN)
6. Maintain a working link in terms of wavelengths.
7. Install a billing process
8. Monitor usage and security 24x7

We will briefly discuss the tasks performed by the network operator.

First, the CPE. This will be provided by the Network Operator. This has to be done by the operator, since this is the only party that knows what colour the customer has (one out of eight). This is one of the reasons for choosing only eight of the available 18 wavelengths, it makes it easier to manage for the operator and the transceivers will be cheaper when produced in larger quantities. Also, the CPE will provide for many Ethernet ports so the customer can choose which service goes to which device. A service provider can still choose to install a home device such as a decoder.

Second, the software. The network operator will deploy a Graphical User Interface (GUI), preferably a web-interface, that allows the end user to choose from a variety of service providers. This GUI will always be available to the end user as long as there is a signal. This GUI could also be used to end subscription of services taking a legal contract between end user and service provider into consideration. The GUI can be used to connect to local portals e.g. by the local government informing about regulations, transport, etcetera. This way, generated traffic will stay within the METRO LAN. A good example of such a portal is MälarNetCity in Sweden.

Third, the connection needs to be made the first time a customer want a service delivered. The great benefit (and distinction from other FttH deployments) is that a patch has to be made only once. Since the service provider is delivering its service at aggregation level, the working link with the customer is never interrupted.

Fourth, to connect a service provider to the POP, a S-VLAN needs to be established. As long as the service provider has presence at the same location as the network operator, a connection can be made. This is a huge advantage for service providers since no large investments in hardware on site have to be made.

Fifth, the service provider has to know an end customer has requested it's service. This is the main target for the operator since this is the bulk of the revenue generated for the operator (and, of course, the service provider). Although, in theory, this can be a fully automated process, it is likely that human intervention will take place, especially in the start up phase. The entire process can be done through software and without engineers on site. This will be a large reduction in operational cost (more about this in the next chapter).

Sixth, to maintain a working link in terms of wavelengths, the network operator has to build up a database containing house numbers and wavelengths. So when a CPE needs replacing, the operator can immediately see what wavelength is needed. For convenience, the transceivers at the POP end must be colour coded so an engineer can easily replace a broken transceiver with a new one.

Seventh, billing! The network operator has two choices, both have been discussed in the past. First choice is to charge the service provider a fee per connected user and a fee for connecting to the POP. An alternative could be that the network operator charges the end user a flat fee and charges the service provider as well. Other examples show that

sometimes the end user pays for the entire deployment of the FttH project (up to thousands of Euros), although that is not a likely scenario for a widespread roll-out.

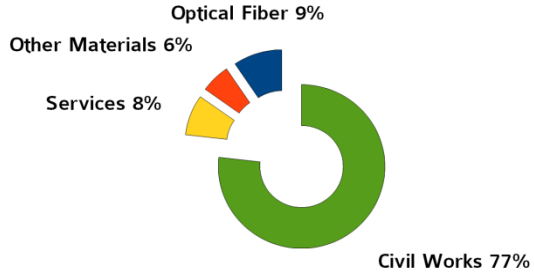
And last but not least, the operator has to monitor the network 24x7 and respond to the scene within an hour (max two hours). Since the operator is the only one allowed into the POP, this requirement is likely to be met.

4. FINANCE

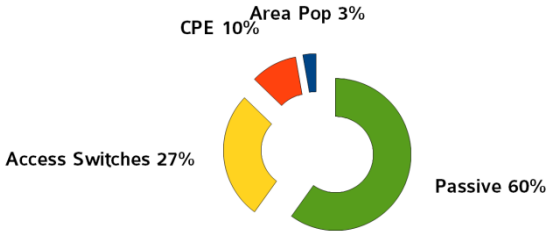
When looking at the finance of a FttH project capital expenditures (CAPEX) and operational expenditures (OPEX) are distinguished. We will focus on the Return On Investment (ROI), since this will be the main driver for investors to participate in FttH.

4.1 CAPEX

In this case we have researched the CAPEX of a typical FttH project in The Netherlands. This example can be projected to a P2P deployment of 20-40K homes. CAPEX can be separated into passive components and active components. For the passive components, the CAPEX consist of civil works [1], materials, services and fiber. This is shown in Picture 5.



Picture 5. Passive CAPEX for P2P networks



Picture 6. Total CAPEX for P2P networks

This shows that most of the passive expenditures consist of civil works. Fiber is only 9% of the amount of passive components. When we combine the passive and the active components, we can see that access switches are the main cost factor for the active components. Passive components still make up 60 % of the total CAPEX. This is shown in Picture 6.

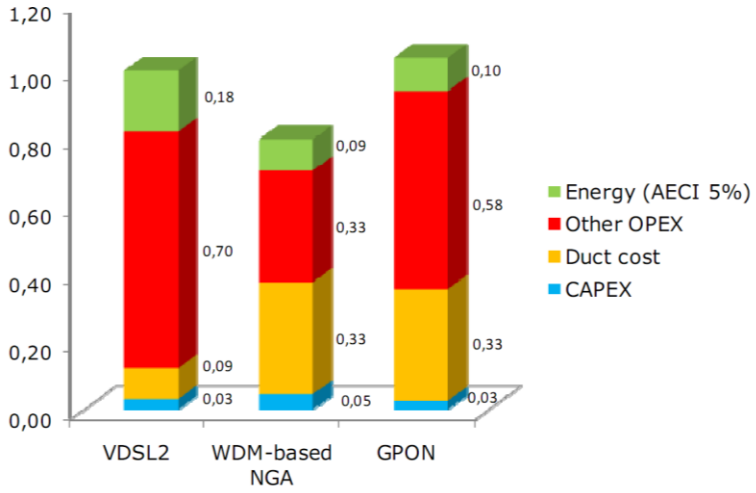
Considering that passive CAPEX cannot be greatly reduced because of the heavy number of Civil Works, CAPEX can be reduced by decreasing the cost of Active components. This has been a focus for many operators. It remains to be justified when looking at the weight of operational cost on the total cost of ownership (TCO).

4.2 OPEX

On OPEX we used the numbers produced by Alcatel Lucent in 2008[15]. Here, Kulkarni, et al. state that an OPEX breakdown at a take rate of 20% will lead to a significant advantage in OPEX for GPON rather than Active Ethernet. The main cost components here are power consumption and active footprint (Cabinet Housing). In our CWDM proposal, there are few cabinet housings and little footprint. So OPEX can be reduced in comparison to P2P.

4.3 Total Cost of Ownership (TCO)

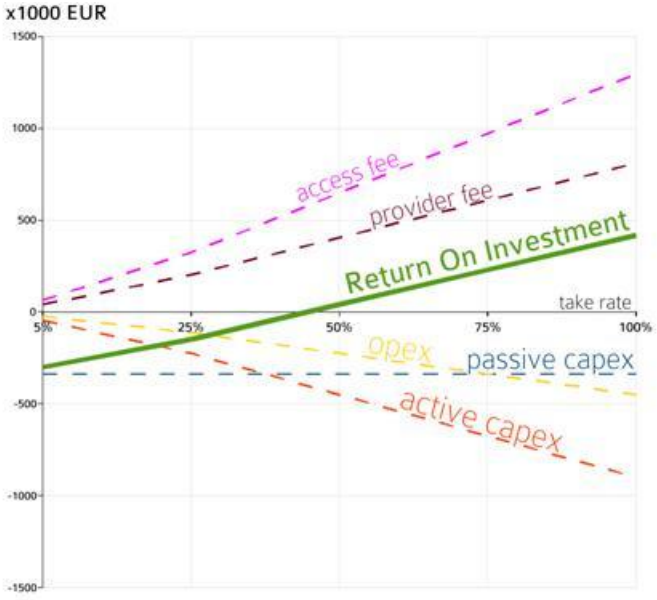
When comparing WDM PON with GPON and DSL, WDM PON is a clear winner in terms of TCO as shown in Picture 7.



Picture 7: Total Cost of Ownership comparison [source:ADVA]

4.4 Return On Investment

What we want to show is the Return On Investment (ROI) and it's dependency on take rate (the percentage of households connected to the available infrastructure). Taking depreciation into consideration: the total initial cost divided by twenty years. The graph in Picture 8 shows the passive capex as a constant. This is because the total passive infrastructure has to be implemented at the beginning of the project. The active capex will increase with the take rate increase. More switches will be installed with an increase in customers. The same goes for opex, calculating with a conservative EUR 50 per connection per year [16]. The charged fees should speed up the ROI. With a provider fee of EUR 5 /service/month/customer, with an estimated average of 1,5 services per customer. Access fees consist of the fee a customer pays to be connected to the network (similar to current copper networks). This is EUR 12/customer/month. The graph shows a break even ROI at a take rate of 45%.



Picture 8: Return On Investment

If we increase the average number of services per customer to 3 instead of 1,5 the breakeven point will be at 22%!

5. OPERATIONS

5.1 Maintenance

Maintenance of a FttH network can be intensive. Especially deploying PON, fault finding can be a nightmare. A regular Optical Time Domain Reflectometer (OTDR) functions on the basis of reflected light. In a splitter that is used with PON, light is divided into multiple connections making it impossible to pinpoint individual faults in the cable. By using 8 channels in an OTDR, the test&measurement equipment treats the line as a point to point connection which makes fault finding as easy as in any fiber network. DWDM and Splitters are far more difficult to troubleshoot than CWDM multiplexers. This concept uses CWDM channels dedicated per connection. The important thing here to consider is careful documentation of the network. But this should always be done in any type of infrastructure. Compared to other WDM PON solutions troubleshooting and fault finding will be the same as for traditional P2P networks and thus requires no intensive training and knowledge.

The products selected for this type of network are Telcordia certified outside plant (-40º/+85º C). The multiplexers are very small and can be used in splice trays and ODFs without requiring much space or special measures. This increases the ease of deployment. Link loss calculations show that up to 50Km connections are feasible in this concept. Even longer distances can be done but after 60Km prices for transceivers rise. However, transceiver prices are dropping every yearly quarter. The maximum technical supported distance for 1Gb ethernet is 100Km. 10Gb ethernet technology is following and can already be used at distances of 40km using CWDM. The rise of 40Gb and 100Gb ethernet will open the path for affordable 10Gb connections to the home. Expected is that within 2 – 4 years this will be feasible on the basis of this CWDM PON design. The use of xWDM channels opens the network for other uses and technical functionality. xWDM is neutral and protocol independent. Security is a consideration too. A xWDM channel is very difficult to tap and use for retrieving information. Other uses like FTTB and other technologies are possible.

5.2. Active Components

To match the passive network design all ports are mapped dedicated passive to active. So per connection a dedicated switch port is available for network access. Also when using 1HU switches we can implement the network in phases. Flexible implementation makes for a cost effective investment on a use-what-is-needed base. The gross volume of all changes should be without physical intervention on the network. They can be done remotely on a software level. Also services are delivered through the network and are not delivered by the network. This makes it easy to manage and control. Service delivery shall be done by a provider chosen by the end customer. This consideration makes for a highly compatible network design. Not all connecting service delivery parties use the same technology. The chosen hardware will be compatible with all of the common carrier network standards. If the network is not flexible and pushes a propitiatory technology it will be difficult to have many different parties for service delivery. For the distribution and core network layers high speed low latency hardware is used. They aggregate 200Gb/s redundant per rack to the core network layer where providers can connect to the network based on the needed bandwidth of the sum of their delivered subscriber services. A minimum of 10Gb redundant per provider would be standard.

All network equipment should be able to handle provisioning. A minimum amount of work should be done by human intervention. Automation is the key to low operational cost and fast service delivery. Calculated spare supplies should be available for the network management party. Problems with active components should be solved fast and safely. The same goes for the software part of the hardware. If the network is configured as simple possible less chance for incidents and problems are to be expected. The CPE is compatible with the needed network standards for this network concept. This will be the endpoint for service delivery and should map a physical port to a virtual network layer that is connected to a service delivery provider network. Also a CWDM transceiver will be implemented in the CPE. This will create 8 CPE variants. This is not entirely true because the CPE is always the same. Only the CWDM transceiver can vary. A good documented network and logistics procedure are needed to handle more than one CPE type. Also the whole network can be implemented based on colour. Every CWDM channel will be connected with coloured connectors, patch cables and such. This way a dedicated channel can always be distinguished by a engineer.

6. COMPARISON OF FTTH TOPOLOGIES

	P2P	GPON	WDM PON	CWDM PON
ease of deployment	high	medium	low	medium
use of splitters	⛔	✓	✓ ⛔	⛔
use of WDM filters	⛔	⛔	✓	✓
low fiber density	⛔	✓	✓	✓
use of Area POPs	✓	⛔	⛔	⛔
passive from CP to CPE	⛔	✓	✓	✓
bandwith sharing	⛔	✓	⛔	⛔
bandwith scalability	✓	⛔	✓ ⛔	✓
maximum bandwith	high	low	low	high
proven technology	✓	✓	⛔	✓
network compatibility	high	low	low	high
open access ready	⛔	⛔	⛔	✓
future proof	✓	⛔	✓	✓
troubleshooting passive	easy	hard	hard	easy
troubleshooting active	easy	medium	hard	easy
capex	medium	low	high	high
opex	high	medium	medium	medium
roi	low	low	low	high
green IT	⛔	✓	✓	✓

7. GREEN IT

By decreasing the total number of active components the total number of CO^2 produced is largely reduced. In point to point infrastructure, normally every 2800 connected homes require 1 Area POP consuming up to 15kW per hour. For every 8 APs on AP is often also a City POP. So with CWDM PON we can eliminate 7 APs saving up to 100kW per hour per project. Apply these numbers to a year's consumption and a staggering 1000 tons of CO^2 is saved. This equals the CO^2 production of approximately 250 cars.

8. CONCLUSION

When increased take rates is a goal of a FttH project, this proposal shows that this is realized by implementing an independent network operator allowing for multiple service providers to deliver their services to the end customer. This will trigger customers into buying more services and higher take rates. Also, by deploying an independent network operator, OPEX can be greatly reduced because of minimal patchwork, close to zero maintenance on fiber, fully automated provisioning, and so on. This will quicken the Return On Investment significantly. Also, by applying CWDM technology, using only 8 channels, the use of fiber compared to P2P infrastructures is minimized. The possibilities, however, are maximized in terms of scale, security, bandwidth and future readiness. Unlike many current FttH solutions, this will not create a legacy network that is hard to manage in a few years. Instead, this will be a sustainable solutions for the next decades.

9. GLOSSARY

AP	Area POP
AWG	Arrayed Waveguide Grating
CAPEX	Capital Expenditures
CO^2	CarbonDioxide
CP	City POP
CPE	Customer Premises Equipment
CWDM	Coarse Wavelength Division Multiplexing
DFB	Distributed FeedBack laser
DSL	Digital Subscriber Line
DWDM	Dense Wavelength Division Multiplexing
GHz	GigaHertz
kW	kiloWatt
ODF	Optical Distribution Frame
ONU	Optical Network Unit
OPEX	Operational Expenditures
OSI	Open Systems Interconnection
OTDR	Optical Time Domain Reflectometer
P2MP	Point to Multipoint
P2P	Point to Point
PON	Passive Optical Network
POP	Point Of Presence
ROI	Return On Investment
SFP	Small Form factor Pluggable
SNR	Signal to Noise Ratio
TCO	Total Cost of Ownership
TDM	Time Division Multiplexing
TFF	Thin Film Filters
UPS	Uninterruptable Power Source

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Category: Technology and Technological

Category: Technology and Technological

Company: Alcatel-Lucent (UK)

Innovation: 10G GPON Prototype

Winner: Alcatel-Lucent – 10G GPON Prototype

Alcatel-Lucent's Innovation

Service providers operate in a highly competitive environment. Their fundamental business strategy for growing market share is to offer the highest bandwidth to end users at an attractive price. Many service providers today are making huge investments in their current GPON networks and need to ensure their networks can evolve to the next level. That is why Alcatel-Lucent believes that the time is right to take a look into the future and explore 10G GPON technology and migration paths.

In 2009 Alcatel-Lucent developed a10G GPON Optical Network Unit (ONU) and 10G Passive Optical Network (PON) line card. This was publicly announced and demonstrated for the first time at Broadband World Forum 2009, in combination with LTE mobile technology. Alcatel-Lucent's 10G GPON platform provides 10 Gb/s downstream capacity and 2.5 Gb/s upstream capacity. Alcatel-Lucent is the first vendor to demonstrate next generation wireline and wireless access convergence.

Although the 10G GPON standard is not yet ratified and volume deployments are expected in a few years, it is important to prove today that 10G GPON is the right way forward for evolving current GPON networks. Alcatel-Lucent has done this and is at the forefront of developing cutting-edge technologies long before they are standardized. The industry anticipates that 10G GPON standards will be ratified in 2010, and Alcatel-Lucent expects to have a commercial product shortly thereafter.

What Alcatel-Lucent's Innovation Means for the Industry

With the surge of high bandwidth residential applications, the demand for more capacity in the fixed access portion of the network is increasing relentlessly.

It is important to prove that the investments that service providers are making today are future safe. It is estimated that 60%-70% of the total investment in PON corresponds to outside plant and it is of utmost importance that it will not be impacted by the evolution of the network. Next Generation 10G GPON can coexist with current generation PON on the same ODN, which means that updates are not needed in the outside plant when service providers migrate their customers from current to next generation GPON.

Service providers need to leverage their triple-play investments with applications that will be new sources of revenue and reduce the cost of delivering high bandwidth services. The initial deployments of 10G PON will target not only residential applications, but also some specific applications such as LTE mobile backhaul. Mobile data services are growing exponentially and this trend will continue as 3G networks evolve to LTE. The escalating operation costs of legacy wireline backhaul experienced by service providers need to be reduced.

Fiber is the ultimate backhaul medium from a bandwidth and reliability perspective, and of the fiber-based solutions, PON is the most cost-effective. That is why Alcatel-Lucent is incorporating specific mobile backhaul requirements, like demarcation and accurate clock synchronization, into its GPON access platform and cell site. It is all about driving more value from the access network. Other applications which Alcatel-Lucent sees as drivers for 10G PON are fiber-to-the-building backhauling and business access services.

Category: Technology and Technological

Company: Iskratel (Slovenia)

Innovation: Open Access with the Innbox F20 and the SI3000 Service-Selection Platform

Iskratel -- Open Access with the Innbox F20

FTTH Network Termination

Innbox F20 (Gemini40F)[1]

In Iskratel, the latest improvements in the Next-Generation Access product evolution are focused to bring a significant value for the operators as well as the end-users. Innbox F20 (Gemini40F) is the newest green technology FTTH NT product, with probably the lowest power consumption among FTTH CPE products on the market.

With Innbox F20 (Gemini40F), based on the FTTH Ethernet Point-to-Point access technology, Iskratel helps the operators to build carrier-class and low-power-consumption solutions for the open-access networks. This enables wholesale broadband services for different service providers. The Innbox F20 (Gemini40F) combines an opto-electrical converter and a LAN switch in a single device. Network providers are able to offer connections up to 100Mbps in both directions using the standard Ethernet technology.

The Innbox F20 (Gemini40F) FTTH NT supports the delivery of all triple play services: internet data, Voice over IP (VoIP) and IP video, including bandwidth consuming HDTV. With per-port per-VLAN quality of service (QoS), the Innbox F20 (Gemini40F) enables real-time multimedia services, such as IPTV and telephony services. It provides four Ethernet ports for packet-based terminal devices and home gateways.

The product enables multiple profile arrangements for symmetrical or asymmetrical connections with CO. This provides the desired bandwidths even on much longer subscriber loops – up to 20km with full throughput – the fiber-optics technology enables it.

The advanced, centralized management of the product supports remote configuration of multiple devices in the access network simultaneously, applying the same profile settings to all devices, along with software upgrades. This is yet another possibility to considerably lower the OPEX in all FTTH deployments. With its integration with the Iskratel SSP (Service-Selection Portal), the end customers are able to configure services and choose their service providers (per service domain).

[1] Iskratel is currently in the proces of CPE portfolio rebranding. The Gemini40F is being rebranded into the Innbox F20.

The product's most differentiated value is in its very low power consumption. It is up to four times lower than the limits defined by the latest EU Code of Conduct on Energy Consumption of Broadband Equipment (version 3, November 2008). The reference benchmarking results are presented in the table (power measured on the 230 Vac input):

Function	LPS (Low Power State)		FPS (Full Power State)	
	09/10	2011	09/10	2011
Fibre Ptp Ethernet WAN (100/1000Base-BX or FX)	3.4W	2.9W	7.1W	5.6W
Fast Ethernet switch, up to 4 ports	0.8W	0.6W	2.2W	1.8W
Total EU CoC target	**4.2W**	**3.5W**	**9.3W**	**7.4W**
Innbox F20 (Gemini40F) reference	**1.3W**		**3.0W**	

The above power consumption of the Innbox F20 (Gemini40F) already includes the power consumption of its local power adapter (which consumes 0.3W). Optionally, the device uses power-supply over UTP cabling (e.g. from the connected Home Gateway), which further eliminates the need for a local power-supply adapter.

The improved power-saving option of the Innbox F20 (Gemini40F) enables the stand-by mode with sub-100mW power consumption. It functions as scheduled or as on-demand. The differentiation from other similar products on the market is in its wake-on-LAN function, which eliminates the need for the inconvenient wake-up button.

End-user benefits

- Significantly lower power consumption than similar products on the market
- Automatic wake-up from stand-by mode (no buttons)
- Remote power-supply using PoE (optional)
- Functional design (small compact housing)

Operator benefits

- Lower operator's TCO
- Carrier class FTTH NT; very convenient for open access networks
- Service separation and prioritization with bandwidth policing
- Support for integrated remote management on Fiber Access Node, possible integration with SSP
- Multiple housing options

Technical Specifications

Local Interface

- 4 port Ethernet 10/100Base-TX (RJ-45), complies with IEEE802.3 and IEEE802.3u
- Automatic MDI/MDIX crossover, Auto-negotiation and speed-auto-sensing, Half/Full duplex support
- Support for 802.1Q and 802.1p VLAN

WAN Specifications

- 1x 100baseBX or FX interface
- Interface types
  - Multimode MM, 2km, Tx/Rx=1310nm
  - Singlemode (SM) 15km, Tx/Rx=1310nm
  - Bidirectional singlemode BiDi, 20km, Tx=1310nm/Rx=1550nm
- LC and SC (for BiDi only) connector type

Bridging

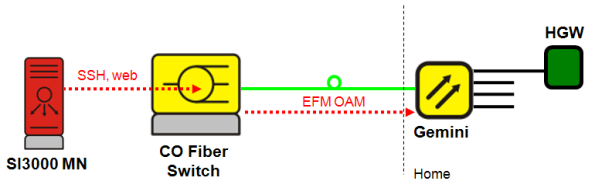
- Transparent Bridging (IEEE 802.1D)
- VLAN tagging (IEEE 802.1Q)
- Supporting QoS (IEEE 802.1p)
- IGMP transparent snooping

Visual Indicators

- Power – indicates power and WAN status

Environment

- Operating Temperature: 0°C ~ 45°C, Humidity: 5% ~ 95% (non condensing)
- Storage Temperature: -20°C ~ +85°C, Humidity: 5% ~ 95% (non condensing)



Configuration & Network Management

- Ethernet OAM
- CLI
- Integrated SI3000 MSAN and SI3000 FTTH management and SSP support
- CATV RF module management option

Power

- External 230 VAC, 50 - 60 Hz, 5VDC 1,2A
- Option for PoE (IEEE 802.3af), Powered Device (PD)
- Power consumption, less than 4W

Physical Dimensions

- (W x D x H) 160mm x 10mm x 30mm, 0.2 kg

Certification

- CE mark, CB, RoHS compliant

Note: some features are hardware dependant, some feature may not be included in dedicated software release

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Open Access with the Innbox F20 (Gemini40F)[2] and the SI3000 Service-Selection Platform

The **Innbox F20 (Gemini40F)** is a green-technology FTTH NT product, with probably the lowest power consumption of all the FTTH CPE products on the market. The product is based on the FTTH Ethernet point-to-point access technology and helps operators to build carrier-class and low-power-consumption solutions for open-access broadband networks. It enables wholesale broadband services for different service providers. The Innbox F20 (Gemini40F) combines an opto-electrical converter and a LAN switch in a single device, and with it, network providers are able to offer connections up to 100Mbps in both directions using standard Ethernet technology.

The product supports the delivery of all triple-play services, including bandwidth-consuming HDTV. With per-port per-VLAN quality of service, it also enables real-time multimedia services.

The Innbox F20 (Gemini40F) provides multiple-profile arrangements for symmetrical or asymmetrical connections with a CO, and in this way, the desired bandwidths on subscriber loops up to 20km with full throughput. The advanced, centralized management supports the remote configuration of multiple devices in the access network simultaneously, applying the same profile settings to all devices, along with software upgrades. This helps considerably to lower the OPEX in all FTTH deployments. At the same time, it completely eliminates the need for the users' involvement in the configuration.

The product's most differentiated value is in its very low power consumption, which is up to four times lower than the limits defined by the latest EU Code of Conduct on Energy Consumption of Broadband Equipment (version 3, November 2008). The improved power-saving option of the Innbox F20 (Gemini40F) includes the stand-by mode with its sub-100mW power consumption. The Innbox F20 (Gemini40F) functions as scheduled or as on-demand, and it is differentiated from other similar products on the market by its wake-on-LAN function, which eliminates the need for an inconvenient wake-up button.

The Innbox F20 (Gemini40F) is one of the two key elements of Iskratel's open-broadband-access solution. The interworking of the Innbox F20 (Gemini40F) with the SI3000 Service-Selection Platform (SI3000 SSP) enables end users to subscribe to new services, cancel existing services, or change service providers by themselves, using an easy-to-use, web-accessible application. The automated network-reconfiguration procedures, triggered by the service-selection platform, provide lower operational costs to the providers, while improving customer satisfaction. In effect, the SI3000 SSP replaces a human operator or a customer-support desk to which a user directs requests regarding chosen services. The service providers gain equal terms for offering the services.

All that the end users need is a broadband connection and the Innbox F20 (Gemini40F) as their broadband termination-demarcation device. They plug in their PC and login to the SI3000 SSP. The users choose from among the services offered by different service providers and delivered across the network provider's network.

Within Iskratel's open-access solution, the SI3000 SSP represents a unique and the most efficient means to provision services, delivered to the users via the Innbox F20 (Gemini40F) FTTH NT product.

[2] Iskratel is currently in the process of CPE portfolio rebranding. The Gemini40F is being rebranded into the Innbox F20.

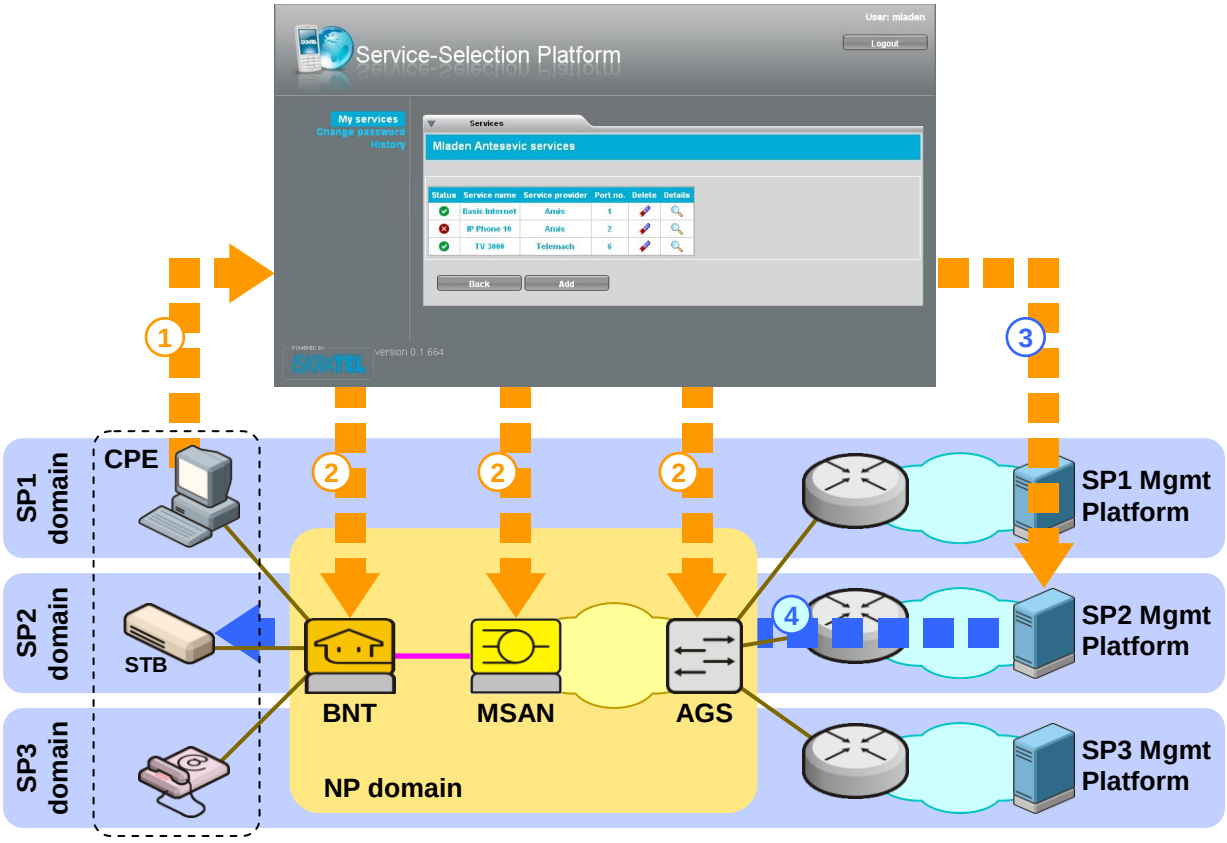
SI3000 Service-Selection Platform

Features and Benefits

- An easy-to-use, web-accessible service-provisioning application
- Intuitive, user-friendly user interfaces with various levels of access
- Easy integration with existing operations-support systems
- Automated, end-to-end service provisioning
- Full control of services and networking resources
- Steep learning curve
- Lower operational costs – no human-operator assistance needed
- Improved responsiveness to customers' requests and improved customer satisfaction
- Management and monitoring interfaces with support for various network elements

The SI3000 Service-Selection Platform (SI3000 SSP) is the key component of the open broadband access that gives the broadband-access customers the full freedom of service selection from among the services provided by different service providers (SPs) and delivered across the same shared network resources of the network provider (NP).

The customers use the SI3000 SSP to subscribe to new services, cancel existing services, or change service providers. Automated recon¬figuration procedures, triggered by the SI3000 SSP, provide lower operational costs to the providers, while improving customer satisfaction.



The typical application of the SI3000 SSP introduces a straightforward, four-phase, provisioning of services.

1. Service selection – The customer uses the customer-premises equipment (CPE) to log in to the SI3000 SSP, where he or she subscribes to the new services or cancels existing services.

2. Path provisioning – The SI3000 SSP triggers the configuration changes across the access and aggregation network to provision a path for the service between the customer's equipment and the SP's gateway.

3. Inter-provider notification – The SI3000 SSP notifies the affected SP of the changes. The SP's management system applies the necessary service-related changes within the SP's network.

4. Service provisioning – Any configuration changes that are necessary on the CPE are performed within the SP's management domain, between the SP's management server and the customer's CPE.

The SI3000 SSP manages several processes that make the business success of network providers possible.

Service-Provider Management maintains an accurate database of all the service providers that provide the services via the network provider's network.

Service Management maintains a database of all the available services, including both their technical (required bandwidth, quality of service, etc.) and non-technical properties (e.g. pricing).

Customer Management maintains a database of all the network provider's broadband customers, and the devices they use for network termination.

Service Assignment enables the most important function of the SI3000 SSP from the customer's perspective: the ability to select from among the available services and create a personalized set of services.

Inventory Management constructs an abstract representation of the underlying network and network elements that need to be configured in the processes of service assignment and monitoring.

Network Monitoring keeps track of statuses of the underlying network and network elements that affect the delivery and availability of services.

Service Monitoring monitors the performance parameters of individual services and its availability to all individual end customers.

Event Monitoring logs all the triggered actions and error cases and allows their full traceability.

Category: Technology and Technological

Company: PacketFront (Sweden)

Innovation: The modular CPE

PacketFront – The modular CPE

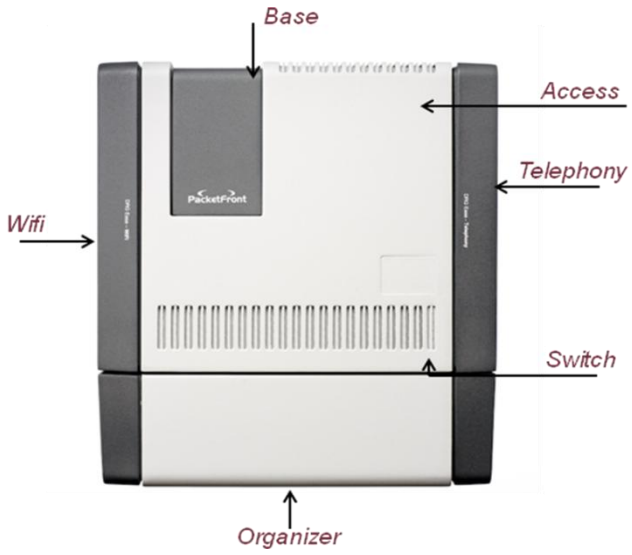
Add modules according to customer's needs

World-first modular concept

DRG Ease (Digital Residential Gateway) is PacketFront's world-leading innovative modular Customer Premises Equipment (CPE) for delivery of multi-play services in FTTx networks. It is based on a "sandwich" principle that builds upon the Base module for passive fiber/TP cable termination. Active modules are then easily snapped on for control and delivery of services.

Many end-users do not want all services. Others are eager to try them but unwilling to pay for the service equipment and access deployment to those who are still unready. Even if the majority of end-users will eventually buy a complete bundle of services, it is likely that they will start with a limited subset and add new services over time.

More flexibility is needed to varying initial investment and being able to offer end users what they want from their broadband connection. The DRG EASE allows network operators and service providers to deploy just the right amount of equipment to provide end-users with the services of their choice.



Product description

Many of today's broadband devices need to overcome two major hurdles: Multiple devices are required to deliver the services and the devices are often neither attractive nor designed to fit together.

DRG EASE provides one product, which is not bigger than a shoebox and it includes all the hardware and software that would normally be included in five to six separate products. All connections between these are internal thus eliminating multiple power supply units and messy cable tangles. DRG EASE only requires a single PSU. Modules like ATA, wireless router or multicast capable access switch are already built into the Telephony, WIFI and Switch modules. CATV services are provided with the Access module complemented with a CATV converter. The uplink came from the beginning with Point-to-Point Ethernet, but is now even developed for a GPON uplink interface. The modern design focuses on both good looks and ease of use for the end-users, network owners and service providers as well as installation engineers.

The DRG Ease modules are individually manageable which allows a separate ownership of each module and thus making it an optional choice for open-access networks. Hence different parties can be responsible and own separate module, for example the network owner is in charge of the Base module, the local ISP owns the Access module and two different service providers can handle Telephony and WIFI.

Fibre Termination DRG Ease – Base

DRG Ease – Base is the module within the DRG Ease series securing the passive broadband connection, i.e. fiber or Twisted Pair (TP) cable in the end-user's premises. DRG Ease – Base protects fiber, TP cables and connectors in the household after installation. It is a durable and robust design for maximum protection. All entry points for fiber or cable include the ability to be secured with a dual plastic strap.

The initial CPE investment can be limited to the passive plastic based fiber termination unit only i.e. the DRG Ease – Base unit. The FTTH Service offerings to the end customer can efficiently be done as a sticker with an advertisement on the DRG Ease – Base unit. For example the advertisement can contain contact information for how to sign up to services.

- Cost effective
  - Short and predictable installation time
  - Consists of few and well defined parts
  - Parts are quickly and accurately mounted by use of snap on mechanics, (no need for time consuming screws)
- Easy snap-on of Access module
  - Eliminate need for patch cables between passive and active equipment
  - Can be done by the end-users themselves
- Marketing area for passive deployment
  - Large embossed area for Network Owner/Operator to promote their broadband service and provide contact information
  - Helps increase end users awareness of services available

Network Termination DRG Ease – Access

Adding the DRG Ease – Access module provides a clear manageable demarcation point for broadband services, which can be bundled for example with a Broadband Internet Service subscription.

The DRG Ease - Access module contains different models for GPON, PTP for Ethernet and CATV.

With the DRG Access module you get:

- Clear and manageable network demarcation point
  - Offering low investment for initial service such as high speed Internet access
  - Remotely manageable via multiple methods to fit in different broadband networks
- User-friendly design
  - Easily snapped on the Base module by end-user or installer
  - Clear graphics with individual numbered LEDs for rapid and easy identification
  - Discrete informative LEDs
- Easy expansion of capabilities by adding Service Extension Modules
  - Add modules when end-user signs up for new services or facilities
  - User can within seconds easily deploy new service modules, today available; Telephony, Wireless broadband router and a Switch offering 5 additional switched Ethernet ports

- CATV module
  - Adds CATV services to the broadband service offering
  - Remotely manageable CATV converter
    - Possible to remotely turn on/off upon customer activation
    - Filter that can be turned on and off for premium channels
    - Retrieve relevant stats and alarms
- Individually manageable in different network types and control able from the network operator
  - Via HDD element manager
  - TR-069
  - SNMP
  - Fully configurable with ini-file via TFTP or HTTP
  - DHCP options

Wireless module DRG Ease – WiFi

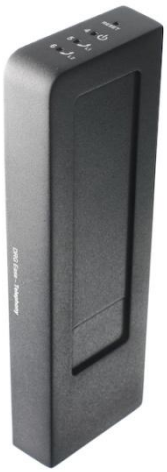
Adding the DRG Ease – WiFi module offers the network operator more advanced ISP services including Wireless LAN and routed fixed LAN ports.

- WiFi wireless home router
  - 54 Mbps wireless router today
  - Next version will support 802.11n dual band
  - Supports IEEE 802.11b / g
  - Out of the box security
  - Internal antenna
  - External antenna can be connected for extended coverage
  - Wireless Protected Setup, a standard for easy and secure establishment of a wireless home network
  - 2 routed LAN ports, NAT and firewall PPPoE
- No PSU or extra cables
- Individually manageable in different network types and controllable from the service provider
  - Via HDD element manager
  - TR-069
  - SNMP
  - Fully configurable with ini-file via TFTP or HTTP
  - DHCP options

Continued...

Telephony module DRG Ease – Telephony

Adding the DRG Ease – Telephony module gives the option to offer Broadband Telephony services on two different telephone lines that can be packaged together with a Broadband Telephony Service subscription.



- Providing carrier-class VoIP services
  - In-house developed SW with feature flexibility and fast TTM
  - Proven high quality VoIP ports with over voltage protection
  - All VoIP protocols available and supported i.e. SIP, H323, MGCP, H248
- Individually manageable in different network types and controllable from the service provider
  - Via HDD element manager
  - TR-069
  - SNMP
  - Fully configurable with ini file via TFTP or HTTP
  - DHCP options
- No PSU or extra cables

Switch module DRG Ease – Switch

Five additional Ethernet LAN ports 10/100Mbpsfor connecting end user clients (Set Top Boxes, etc)

- IGMP snooping for high quality IPTV services
- High speed Internet access
- Advanced switch features such as queue in queue service provider tagging
- Non blocking
- Individually manageable and controllable via the Access module
  - Via HDD element manager
  - SNMP
  - Fully configurable with ini-file via TFTP or HTTP
  - DHCP options

DRG Ease – Organizer

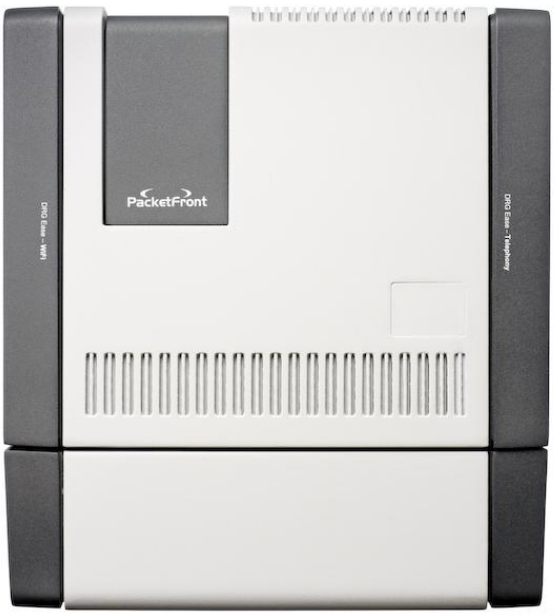
The organiser is not offered, but can be included in the offer on request

- Organize the installation
  - Reduces cable tangle around the DRG Ease
  - Multiple removable cable-port covers allow cable leads in several directions. (Connecting end user devices (PCs, Set Top Boxes, IP phones etc) and PSU
  - Smart and innovative openings from the side of cable tray to let cables from WiFi and Telephony modules in
- Protects connectors and cables from household damages
- Designed to form a unified look together with the DRG Ease

Protects connectors

Summary

We call the DRG Ease since it is really easy to install even a child can do it. And we call it is Ease since you can easily add services as required by your end-customers.



DRG Ease equipped with all options

Category: Technology and Technological

Company: Portugal Telecom (Portugal)

Innovation: RF-BOX

PT Inovação – RF-BOX

Corporate Representative: Alcino Lavrador (CEO)

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RF-BOX - Boosting PON utilization through the provision of RF-only TV services

Today's GPON deployments with RF overlay enable the most advanced delivery of services to consumers, by providing not only the broadest bandwidths available, both downstream and upstream, but also by leveraging in-home coax cabling for traditional television services. Although this infrastructure is optimal for multiple-play services, there are a considerable number of fiber end-points (houses, apartments, etc) whose owners are only interested in TV services.

This paper describes a product that gives PON operators the ability to provide traditional "cable-like" TV services for customers that are not interested in having voice, Internet and IPTV services, whether because they do not use it or because they have other alternatives for those services (GSM, 3G, LTE, etc). With such a product, the PON operators may optimize the use of the installed fiber infrastructure, by being able to operate as a traditional cable TV provider. The paper also points out the advantages and disadvantages of the introduction of such a product and is also explains why this product allows a low CAPEX and OPEX TV service provision.

Introduction
All over the world, mainly the incumbent telecom operators, are starting the deployment of passive optical networks (PON), most of them GPON, as a way to be able to compete with the CATV operators that with DOCSIS are able to provide both high quality TV services and also high speed Internet at a level that DSL services are unable to cope.

The PON infrastructure, using GPON, is able to provide high speed Internet, together with high quality TV services (both IPTV and IP base VoD) and also voice telephony. Some of these network operators are also using the same PON infrastructure to overlay RF TV services. On the customer premises, there is a CPE that is both a GPON terminator (OTN) and an optical-to-RF signal converter for the RF overlay TV services.

On another hand, the deployment of the PON infrastructures foresees that fiber is installed to every house on the covered areas. As expected, not all the covered homes will request the GPON service, whether because they have other service providers for triple-play, or because they are not interested in all the services (and consequently paying for them) that the GPON infrastructure is able to supply. That is, for a not so small slice of customers, these are too many services. There are consumers that, so far, do not feel the need for a lot of bandwidth or have their connectivity provided by other means like, e.g., 3G. Nevertheless these consumers still may want a lot of TV channels delivered the conventional way. Traditional cable operators are shrinking they analog channels offer because they need the bandwidth for Internet and interactive services, but as GPON uses different wavelength for these services the full RF bandwidth is available for TV services delivery. Another important issue is the quantity of analog TV sets already in use, and many of them will last for a few more years.

RF-BOX CPE

With these facts in mind, PT Inovação, keen to provide a cost effective solution for Telco's GPON operations to compete with cable operators in their core services, designed the BOX-RF conversion unit. This equipment is a strip-down of PT Inovação ONT CPE that allows an operator to deliver a RF only digital and analog TV service, leveraging the already in place passive fiber optic distribution network. It provides GPON operators with a solution to recoup network deployment costs by creating a simplified RF only television service, both to FTTH and FTTMDU customers. This service will compete directly with classic cable services, but providing much more TV channels and with a much better quality, without rewiring the customer's already available in-home coax distribution. The BOX-RF main feature is the capability of converting optical TV analog signals into electrical TV signals to be distributed, with sufficient power, to all in-home divisions without the need for external amplification.

Figure 1 and Figure 2 below, present the targeted network architecture, showing how the GPON service and the RF-only service are provided simultaneously over the same infrastructure.

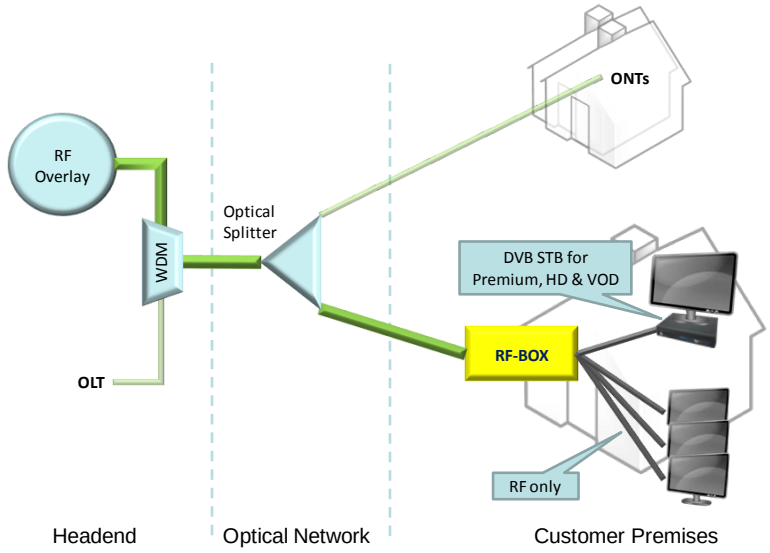

Figure 1 – Residential Solution

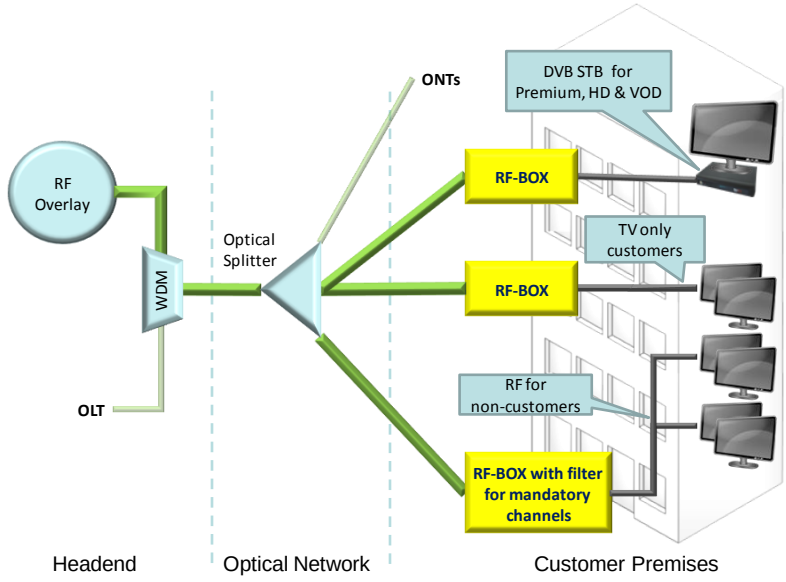

Figure 2 – MDU Solution

The BOX-RF unit developed by PT Inovação, presented in Figure 3, is small and is able to provide the Telecom Operators the capacity of developing, with trust, PON networks with operational savings.

As the BOX-RF is available at a fraction of the cost of a full-featured ONT, it means that this kind of RF only TV service will have a low CAPEX and also a very low OPEX, since the whole network is passive and the device powering will be at the customer's house. With a power consumption of only 2.1 watts, it provides for a very energy-efficient solution, helping the achievement of a rewarding 'green' status.

Figure 3 – BOX-RF

Besides creating a new product for the PON operators and reaching a market that is the feud of cable operators, it also allows for customer enticement for more powerful services migration after a successful installation.

Conclusions

The product presented in the paper is targeted to allow the PON operators to be able to optimize the network infrastructure, by enabling that more fiber end-points have customers connected, that otherwise would never be used. These customers also may be very important in two different ways: (i) they represent new customers that latter may request other PON services and (ii) they represent customers that will not establish a thrust relationship with other TV service operators. Together with a low CAPEX and OPEX, this product may be the key for a very successful PON operation.

Category: Technology and Technological

Company: ZTE (France)

Innovation: World's First Unified PON Platform

ZTE – World's First Unified PON Platform

ZTE ZXA10 C300 multiservice optical access platform is world's first unified platform supporting GPON, EPON and P2P as well as the next generation PON in one platform.

BENEFITS

ZTE's "One Size Fits for All" ZXA10 C300 offers the following benefits to customers and end users:

Reduced power consumption and carbon footprint

ZTE's ZXA10 C300 embraces many state of the art capabilities to reduce power consumption and have a direct impact on the carbon footprint of telecommunications networks.

- Up to 41 percent power savings with versatile power management technique enabling idle mode functionality at port, board and module levels. Idle and sleep mode of PON port and ONT greatly reduce ZXA10 C300 power consumption when there is no connection or traffic in the ONT: key components like optics, Ethernet PHY and SLIC of the PON port and ONT are shut down
- State of the art ASIC silicon design replaces the traditional "power-hungry" FPGA architecture. Higher integrated ASIC instead of two or three chipset to realize the same function means 50 to 66 percent power savings. Latest chipsets with lower power consumption are used and ASIC design instead of FPGA. A more efficient power module specifically developed for reduced power consumption was incorporated.

Compared to the recommendation of the European Commission code of conduct on energy consumption of Broadband equipment, ZXA10 C300 offers 41% less power consumption level per port (10.5 W for ZTE versus 18 W for CoC in 2009). The power savings could be equivalent to 10.3 million pounds of CO2 and over 530 000 gallons of gasoline, based on a 5 million subscriber network.

Higher site savings

ZTE ZXA10 C300 offers a higher density of PON modules with 8 GPON ports per module and 1:128 splitter ratio for each GPON port, which allows 16384 users to share the same platform. In the 10GEPON configuration, 2/4 10GEPON ports per module are offered and a 1:128 splitter ratio is available for each 10GEPON port. This gives the platform a distinct advantage in scalability and flexibility, and reduces the need for redundant infrastructure.

The ZXA10 C300 has superior coverage span with a range up to 60 km using transceiver power of Class B+ or Class C+ and an extender box. With WDM PON interfaces, the coverage can reach 100 km. Compared to traditional OLT designs, ZTE ZXA10 C300 combined density & coverage benefits allow higher OPEX savings and hence, less sites are needed.

Future proof

A smooth evolution path to Next Gen PON is possible with ZTE ZXA10 C300: only 1 new module is needed for the upgrade to 10G-EPON (or XG-PON1 or WDM-PON). This enables additional CAPEX savings compared to a traditional design requiring the change of heavy hardware to evolve to Next Generation PON. By offering a future proof platform, ZTE ensures operators that the initial investments are preserved. Compared to a traditional design, there is no parallel configurations needed introducing redundant and power consuming equipment.

Better user experience

ZTE ZXA10 C300 offers not only powerful QoS, security control and self-care software for end users, but also higher bandwidth to end-users with 10G-EPON with at least 100Mbps to each ONT or end user considering 1:128 splitter ratio.

Lower TCO

A business case study for a network evolution to 10G-EPON has been performed comparing ZTE ZXA10 C300 with a traditional solution. As a result, ZXA10 C300's major benefits such as higher site savings and future proofness lead to higher CAPEX savings: less equipment investment and spare parts are needed, and Installation & Commissioning costs are reduced : ZXA10 C300 offers over 60% CAPEX savings after 1 year and 36% after 4 years to operators compared to a traditional solution based on heavy hardware and software.

Moreover, the major benefits of ZXA10 C300 also lead to higher OPEX savings: less site rentals, operations and maintenance are needed. In addition, lower power consumption levels contribute to dramatically lowered OPEX: ZTE ZXA10 C300 offers over 52% OPEX savings after 1 year and 39% after 4 years to operators compared to a traditional solution.

Finally, the TCO savings based on this study reach over 37% four years only after initial roll-out.Combined OPEX & CAPEX savings help operators lower their TCO and increase their revenues.

TECHNICAL DESCRIPTION

Key features

- GPON/EPON/P2P/10GEPON unified platform
- Large capacity and high density : meet operators' requirements for mass optical access roll-out
- Future-proof: supports NG-PON, like 10GEPON, 10G GPON, WDM PON, LR PON, etc.
- Abundant service support capability: IPTV, VoIP, HSI, VPN, mobile backhaul, etc
- Diverse interfaces: besides P2MP, P2P and TDM interfaces can also be provided for business and residential application
- Enhanced multicast function: meets mass IPTV roll-out
- Higher security assurance: ONT authentication, user ID identification, port isolation, address binding, packet filtering, broadcast packet limitation.
- Service differentiation: Comprehensive QoS mechanisms for voice, video and high speed Internet services.
- Flexible networking topologies: Various uplink interface and subtending interface
- High reliability: key component redundancy, type B and type C PON optical fiber protection, uplink interface redundancy and load balance

Main technical specifications

- Capacity
  - Matrix capacity: 800Gbps
  - Bandwidth per subscriber slot: 40Gbps

- Chassis Configuration (21")
  - Backplane capacity: 3.2T
  - Total 23 slots
    - 16 slots for universal line cards
    - 2 slots for main control cards
    - 2 slots for power cards
    - 2 slots for uplink and cascading interfaces
    - 1 slot for environment monitoring card

- Chassis Configuration (19")
  - Backplane capacity: 2.8T
  - Total 21 slots
    - 14 slots for universal line cards
    - 2 slots for main control cards
    - 2 slots for power cards
    - 2 slots for uplink and cascading interfaces
    - 1 slot for environment monitoring card

- Subscriber Card Density
  - GPON card: 8 ports per card
  - EPON card: 8 ports per card
  - P2P card: 16 ports per card
  - 10G EPON card: 2 ports per card

- Uplink interface card
  - 2*10GE uplink card
  - 4*GE uplink card
  - 1*STM-4/OC12 uplink card
  - 2*STM-1/OC3 uplink card
  - 32* E1/T1 uplink card (balanced and unbalanced)

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