Report on standardization and dissemination activities II

D8.4

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DEUTSCHE TELEKOM AG	DTAG	D
iMinds VZW	iMinds	B
TECHNISCHE UNIVERSITAET MUENCHEN	TUM	D
KUNGLIGA TEKNISKA HOEGSKOLAN	KTH	S
ADVA OPTICAL NETWORKING SE	ADVA	D
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Abstract:

The objective of this document is to describe the outputs associated with the Use and Dissemination of the knowledge arising from the OASE project. In order to give a cumulative overview of the activities undertaken and planned in the project, regular updates have been implemented, so as to lead to a final plan to give a complete view of the activities undertaken (such as an exhaustive list of all the papers, contributions to standardization forums, and public demonstrations published or performed within the lifetime of the OASE project) over the time period from 1st January 2010 to 28th February 2013, as well as to describe a future route to the full use and dissemination of the knowledge gained over the course of the project.

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4	2	0	Marco Forzati	01/08/2013
	Comments:	editing		

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1. Referred documents

[1] Project Contract GA 249025 and Annex II (General Conditions)

[2] Project Contract - Annex 1 "Description of the Work" (DoW)

[3] OASE Consortium Agreement (CA)

[4] Rules for Participation (RfP) - Regulation (Ec) No 1906/2006 Of The European Parliament And Of The Council

[5] OASE D2.1: Requirements for European next-generation optical access networks

[6] OASE Deliverable D3.1: Overview and assessment of existing optical access network architectures

[7] OASE Deliverable D4.1: Survey of next-generation optical access system concepts

[8] OASE D5.1 Overview of tools and methods

[9] OASE D6.1 Overview of tools and methods and identification of value networks

[10] OASE D8.1 Project Presentation, communication plan and dissemination plan

2. BACKGROUND AND DEFINITIONS

All definitions are listed either in the Annex II – General Conditions to the Grant Agreement – or in the Consortium Agreement.

A reminder of some of the essential definitions is given below.

"**Confidential Information**" means any and all information that is disclosed or otherwise made available by the disclosing Party to the receiving Party pursuant to the Consortium.

Agreement including, without but not limited to: Background or Foreground; financial information, such as but not limited to pricing and customer lists; technical information, such as but not limited to research, development, algorithms, procedures, software and know-how; business information, such as but not limited to operations, planning, marketing interests and products.

Such information may be disclosed or made available orally, in written (including but not limited to, fax, e-mail, text message (SMS) or machine readable format or other tangible including but not limited to raw materials, components, models, prototypes or any tool or equipment whatsoever) or intangible form (including but not limited by visual inspection during any tour of the disclosing Party's facilities or premises).

"**Dissemination**" means the disclosure of foreground by any appropriate means other than that resulting from the formalities for protecting it, and including the publication of foreground in any medium;

"**Use**" means the direct or indirect utilisation of Foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service. Direct utilisation is done by the participant owning the Foreground (e.g. though further research or commercial or industrial exploitation in its own activities) while indirect utilisation is done by other parties (e.g. through licensing).

Dissemination can be seen as the means (i.e. press releases, conferences, scientific publications, exhibitions, workshops, newsletters, websites, etc.) through which research results are presented to the public.

It is important to notice that official publications in the course of a protection right application (e.g. the compulsory publication of a patent application after its filing) are not considered dissemination. The target of the dissemination may be the general public or a specific group of professionals in a determined sector. An overview on the most successful means of dissemination, as well as useful suggestions on how to arrange an effective communication strategy, can be found at the European Commission "Guide to successful communications" web page(http://ec.europa.eu/research/science-society/science-communication/index_en.htm).

There is no obligation in FP7 to disseminate after the end of the project. However, the Commission may take charge of such obligation at any time, without requiring any authorization from the Participants concerned.

All Documents also need to contain the following specific sentence (or a translation thereof) in the description referring to FP7 funding (Article 45 RfP – Article II.28.2 of GA):

"The work leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement n° 249025"

Use of the EU emblem

The EU emblem may be used only with the prior agreement of the Commission. As the European emblem is protected under Article 6 of the Paris Convention, participants are formally prohibited to register the European emblem, or any sign identical or similar to the European emblem, as a trademark. When participants are allowed to use the European emblem, they should do so in its entire and original form, and always separately from their own logo or trademark. Once the contractual relationship between a participant and the European Commission has expired, the participant should cease to use the European emblem, and withdraw its representation from any new documentation.

Confidentiality and protection

References: Articles 3 – confidentiality - and 46 - Use and dissemination - of RfP and Articles II.9 and II.30 of GA

Where dissemination of Foreground does not adversely affect its protection and use, there is an obligation to disseminate it swiftly. However, no dissemination of Foreground may take place before a decision is made regarding its possible protection. Indeed, any disclosure, even to a single person who is not bound by secrecy or confidentiality obligations (typically someone from a different organisation outside the consortium), prior to filing for protection, can be considered as constituting a disclosure detrimental to patentability, be it by written (including by e-mail) or oral (e.g. at conferences, or even to a single person) (Article 46.3 RfP – Article II.30.2 of GA).

Evidently, no dissemination at all may take place if it is intended to protect the Foreground as a trade secret (i.e. confidential know-how).

Confidentiality obligations are also detailed in the Consortium Agreement (article 4.3). Any data which is to remain secret should be clearly marked as confidential and appropriate measures should then be taken by the other participants and the Commission to maintain confidentiality, even after the end of the project.

As a reminder, the Consortium Agreement foresees a period of confidentiality to be five years from the date of termination of the CA, (except for Source code Foreground – 10 years delay) unless one of the exceptions detailed in the CA.

3. COLLABORATION AND DISSEMINATION ACTIVITIES

During the project duration, OASE has produced a massive amount of publications, generated lively discussion exchange by means of multidisciplinary workshops, nicely leveraged collaboration with other projects, involved people from industry, policy-makers and academia on technical, business and regulatory topics. As a result, OASE, its activities and the FP7 programme have become known outside scientific community.

Moreover, OASE has intensely discussed the request for comments on EC Guidelines (quite unique for an FP7 project), the output of whose discussion has resulted in some partners to send a response, officially accepted by the EC and publically visible on the EC website.

3.1 ACTIVITIES BY THE CONSORTIUM M1-M38

3.1.1 International and National Events targeted

Project results have been published through articles and papers at various international and national conferences and workshops. OASE has had a presence at the following events (see list of publications below for further details):

- OFC/NFOEC 2010
- CTTE 2010
- ICTON 2010
- ECOC 2010
- ACP 2010
- SPIE Photonics West 2010
- FITCE 2010
- OFC/NFOEC 2011
- CTTE 2011
- ICTON 2011
- ECOC 2011
- ACP 2011
- SPIE Photonics West 2011
- ONDM 2011
- FTTH Forum 2011
- OFC/NFOEC 2012
- CTTE 2012

- ICTON 2012
- ECOC 2012
- ACP 2012
- ONDM 2012
- FTTH Forum 2012

Moreover, the project results will be presented at few more prestigious events during the spring of 2013, including ONDM 2013, where the OASE project has been invited to organise a dedicated workshop.

3.1.2 Dissemination to university students

In total 5 partners in the project have close relations to universities and colleges. The academic partners of the project have disseminated the project vision and results within their students in the form of lectures and courses:

- KTH IK1611 Dimensioning of Communication Systems, a graduate course taught in the period January – March to 30 students, in 2010, 2011 and 2012.

- KTH IO2654 Optical Networking, a graduate course taught in the period January – March to 48 students, in 2010, 2011 and 2012.

- TUM 72455 "Advanced Network Architectures and Services 2" summer semester course dedicated to optical networks, given in 2010, 2011 and 2012.

- Guest course on optical networking at University of Canterbury in Christchurch, New Zealand, summer 2012; the course was targeting students of the last year of their master programme.

3.1.3 Activity of the Industry Board (IB)

The OASE project has the aim to establish a channel of communication with other European network operators to share and discuss the OASE requirements and architecture approaches, in order to achieve a common understanding of NGOA network development and a common European view on the requirements to enable a widely-accepted standardisation as a basis for mass-market production and interoperability, with the expectation of attaining low unit costs arising from high a volume of scale. The Industry Board includes the major incumbent telecom operators in Europe today.

➢ The Industry Boards (IB) members are:

- Telecom Italia (TI): Mr. Paolo Solina (currently Chair of FSAN)

- France Telecom (FT): Mr. Bruno Capelle (member of the FSAN management)

- British Telecom (BT): Mr. Derek Nesset

- Telefonica (TID): Rafael Canto Palancar (rcanto@tid.es)

One meeting of the Industry Board in 2011 has taken place, co-located with the general FSAN meeting in May 2011, which was organised from 23rd to 26th of May 2011 in Berlin, Germany. The scope of the meeting was to provide the IB members with an overview of the aggregated requirements after bi-lateral discussions, and to report on the general status of the OASE project, particularly with respect to the cost-per line estimations of different technologies that were analyzed so far. There was positive result arising from the meeting

featuring: useful feedback from the operators on cost-per-line modeling, and interest from the IB to be in a position to receive background information. As a next step it was proposed to distribute the OASE results with respect to cost-per line modelling and gather additional feedback from the IB members.

A second meeting of the IB is now in the process of being organised, to present techno-economic results from the project. The meeting will occur during Q2 of 2012. The location and exact date of this meeting are still being planned and will be agreed at the beginning of the second half of 2011. It is expected that the topic under discussion for this meeting will be the results arising from the project techno-economic analysis and co-operation models since pure technology issues are already discussed under the FSAN umbrella.

In addition, the following bi-lateral meetings have also taken place:

- Telefonica: a meeting was set up with Telefonica on 16 December 2010 in Madrid. The intention of the meeting was to establish an information exchange between Telefonica and OASE (represented by DT) with respect to NGOA requirements based on the deliverable D2.1 "Requirements for European next generation optical access networks". Telefonica was pleased to note that the OASE view concerning drivers, requirements, and potential technologies for NGOA networks tended to support their own views in this area. A subsequent on-going collaboration programme was agreed, with a continued exchange of information relating to NGOA topics in terms of bi-lateral meetings, industry board meetings, with the specific follow-up bi-lateral meeting in Berlin in May 2011 organised. Preliminary topics for future active consideration include: technology options for NGOA (identifying key components and associated challenges), and a discussion on architecture options.

- British Telecom: a meeting was set up on 2 March 2011 in UK. The intention of the meeting was to establish an information exchange between Telefonica and OASE (represented by DT) with respect to NGOA requirements based on the deliverable D2.1 "Requirements for European next generation optical access networks". After intense discussions with BT is was agreed to try to have an IB meeting co-located with the FSAN meeting in May in Berlin.

- France Telecom: a meeting was set up for 5 April in Lannion (France) with focus on discussion of the network/equipment and infrastructure requirements. France telecom presented also their view on node consolidation and associated length and fan-out (splitting) requirements.

- Telecom Italia: a meeting was held on 10 May 2011 in Turin. The topic of the meeting was discussion of requirements and drivers for NGOA with a special focus on infrastructure needs for node consolidation scenarios.

- On 11 December 2012 a one day workshop regarding OASE results and the potentially impact on network strategy was held in Lannion with France Telecom (Orange). Overall good agreement was found between the OASE outcome on techno-economics and FT internal studies, even if the absolute numbers differed the ordering of potential solutions was similar.

3.1.4 The Alternative Operators' Board (AOB)

As an Action Point following the 1st Year Review, the OASE consortium has identified additional candidate representatives from alternative (non-incumbent) operators with a

potential interest in optical access network deployment, and formed a dedicated body: the Alternative Operator's Board (AOB).

The Alternative Operators Board is chaired by IBBT (now iMinds). The purpose of this board is to gather views and directions from actors on the requirements and the choice made by the project in order to complement the feedback received by the Industry Board, which consists of different incumbent operators. The AOB received the relevant deliverables as well as first conclusions and recommendations from the project, and had the opportunity to comment these results.

Besides inviting the AOB members to our workshops (the two Workshops on Municipal FTTH Networks in 2011 and 2012, and the ECOC Workshop on Open Access), we had dedicated bilateral meetings were held during 2012, where the results of the project were discussed, as well as changes recommended by the AOB. Equally importantly, input was gathered regarding transaction costs, and business operation considerations on open networks.

The members of the AOB are:

- Karlstad Stadsnät (Sweden): Hafsteinn Jonsson
- Stokab (Stockholm, Sweden): Anders Broberg
- Vodaphone Germany: Stephan Zimmermann
- M-net (Munich, Germany): Jens Prautzsch
- Vodaphone UK: Sergio Tzianos

Mr. Broberg gave a talk at our ECOC 2012 workshop, while Mr. Jonsson gave a talk at the Second Workshop on Municipal FTTH Networks in November 2012. Also, bilateral meetings were held with both of them throughout the year. Precious input was collected regarding transaction costs for Open Access networks, the technical and business operation of fibre networks. We also heard their opinion on regulatory issues.

Contact with the other members was mainly held by e-mail but due to travel restrictions no physical meetings were successfully held.

3.1.5 Dissemination at Concertation and Cluster Meetings

OASE has participated in EC Future Networks concertation meetings since the outset of the project. Co-operation has also been established in particular through the Converged and Optical Networks (CaON) cluster of the FP7 Future Networks (chair until beginning of 2011: Dr. Mikhail Popov, Acreo; and co-chair: Prof. Peter van Daele, IBBT – both organisations being OASE partners.)
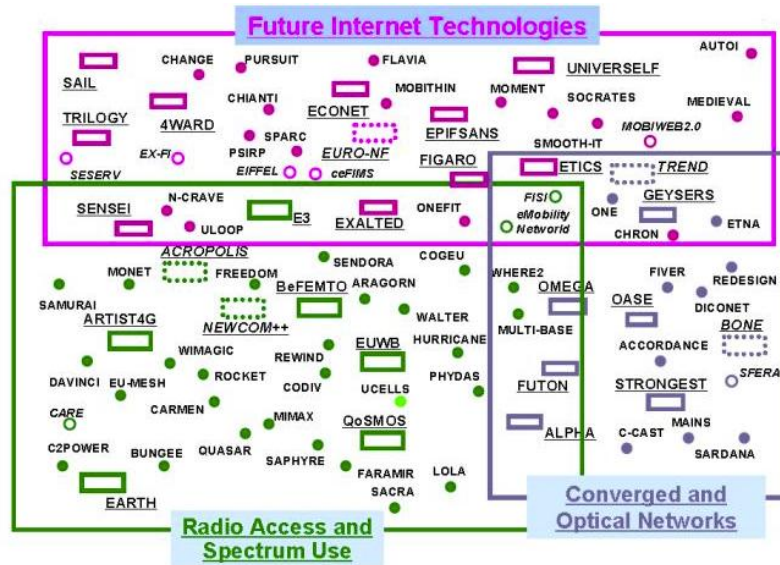
Figure 1 - ICT Future Networks project Portofolio & Associated Clusters

CaON is the cluster for Future Networks FP7 projects. A CaON cluster workshop was organised by the cluster leader, ALPHA, and saw the participation of the ALPHA, TRAMMS, OMEGA, GEYSERS, ETICS, STRONGEST, MAINS and BONE projects. The event took place outside Stockholm 6-8 October 2010, and took the form of technical presentations from the different projects on various specific topics (Future Internet and Future Networks: Reference model and Application-Network interaction; Sustainable/green ICT: how it concerns us and what can we do; Peer-to-peer as a content distribution technology: State-of-the-art, impact on the network design, and legal aspects; Open Network Business Models), with a lot of time additionally dedicated to round-table discussions.

OASE has participated in various concertation meeting in Brussels on January 2010, October 2010, February 2011, June 2011, February 2012, October 2012 and finally in February 2013 where some latest results where presented. A CaON meeting was organised in September 2011 at ECOC. JCP, Acreo and IBBT participated in those meeting, during which status updates of the OASE progress were given and the selected NGOA architectures presented, together with their functional relationship to relevant business models. Moreover, a CaON white paper and a presentation for the Future Network and Mobile Summit (June 2011) and last October in Poznan were produced.

3.1.6 Collaborations with Technology Platforms

Close collaboration with the European Technology Platforms (ETP) has been fostered. Several partners of our consortium are closely following the activities of the ETPs, and have been especially active in:

- Photonics21 (23-24 February 2011 in Brussels), more specifically OASE is active in WG1 (WG1 is chaired by Ericsson, and also has active participation from ADVA)
- NEM Summit 2010 (13-15 October 2010 in Barcelona).
- Future Internet Assembly 2010 (15-16 April in Valencia, Spain; and 15-16 December in Ghent, Belgium) and in 2011 (7-19 May, 2011, Budapest, Hungary).
- Future Network & Mobile Summit 2010 (16-18 June 2010, Florence, Italy), 2011 (15-17 June 2011, Warsaw, Poland) and 2012 (4-6 July, 2012 Berlin, Germany) assisting in the relevant dissemination activities.

OASE was also active in the work towards the Future Internet Assembly Strategic Research Agenda Vision.

OASE has already discussed with NEM about collaboration for dissemination:

- NEM has already agreed to insert OASE information (on a case-by-case basis) into their newsletter; more generally we are also trying to use the NEM mailing list to broadcast information about the OASE project.

- It is planned to present OASE results at the next NEM GA on 27-29 September 2011 in Torino, Italy.

3.1.7 Collaboration with other relevant projects

OASE has established co-operation with other projects within and outside FP7, by organising concertation workshops with the following European projects (see the workshop list below):

- ✓ ICT ALPHA (now completed) on techno-economics studies (ALPHA's co-ordinator is Dr. Mikhail Popov, Acreo, also a partner in OASE);

- ✓ SARDANA (now completed), on ring-based WDM PON architectures with Raman amplification;

- ✓ GIGAWAM, on next-generation PON components;

- ✓ ACCORDANCE, who is expected to closely collaborate to further investigate the potential of OFDMA technologies;

- ✓ STRONGEST, on next generation backbone networks;

- ✓ EURO-FOS on access technologies;

- ✓ SPARC on control and management;

- ✓ Celtic-TRAMMS, which has performed traffic measurements used in D2.1;

- ✓ Celtic-HIPNQSYS, which is performing traffic measurements used in WP2 and WP3.

A joint workshop with the ACCORDANCE project has been held in Athens, Greece co-located with BROADNETS 2010. Moreover, another joint OASE/ACCORDANCE workshop on next generation networks is planned for February 2012, with participation also from the coordinator of the recently concluded FP7 project IP-ALPHA.

The BROADNETS 2010 workshop, the programme of which can be found on the OASE homepage, generated interested discussion, and the following points were reached:

1. OASE testbed may present interest for ACCORDANCE

2. Mobile backhauling represents joint interest of both projects.

3. Results of MAC simulations in ACCORDANCE project can be of interest for OASE project.

4. Low-Power techniques provide big interest for both projects.

5. Technical performance of Rx for OFDM signals, as well as components cost is common interest

6. OFDM-based equipment energy consumption is common interest.

7. Laser types and laser tuning

8. Techno-economic studies of OASE provide big interest for ACCORDANCE

9. OSP costs sent to IBBT

An open event was also organised at the FTTH Council Europe conference in Milan, Italy on 8 February 2011. Five European projects (ALPHA, OASE, ACCORDANCE, SARDANA and GIGAWAM) met together to discuss the future of optical access in Europe. The projects covered a broad range of subjects, including technological, economic and political aspects. In particular, the projects addressed: the challenges of FTTH deployment over near- and long-term perspectives; the choice of technology (active or passive) for specific scenarios; future technologies for access such as WDMA and optical OFDMA; as well as other additional specific technical issues. The workshop programme and minutes can be found on the OASE website.

OASE presented early results on power consumption of OASE architectures attended a workshop on Energy efficiency organized by STRONGEST in Pisa in 2011 (and UEssex is a partner in both projects).

In February 2012, OASE co-organised in Tallinn (Estonia), with ACCORDANCE and ALPHA projects, a workshop entitled "Delivering high-speed Broadband through Next generation Networks" where respective views on trends in next generation converged, wireless and optical networks were discussed.

During 2012, OASE also attended a plenary meeting of the FP7 NoE TREND (Towards Real Energy-efficient Network Design) project, which served as an opportunity for some useful information exchange between OASE and TREND. OASE and our D4.2.2 work related to energy efficiency was briefly presented. A possible collaboration during the last few months of OASE is now being considered.

Collaboration was also established with the SPARC project, in the area of virtualisation for access aggregation networks and on the techno-economic assessment. SPARC advised OASE on aspects of how virtualisation could be enabled and what specific aspects should be considered. In addition, feedback and discussion have been valuable input to the development of the architecture of virtualised networks in SPARC. For the techno-economic assessment, an information exchange on network structures and costs has been performed.

In addition to the aforementioned EU projects, a connection has also been established with the EU FP7 project C-3PO. This connection is established via the common project partner ADVA and provides system-level feedback from OASE into C-3PO, and components-level feedback in the opposite direction. This connection is supported on an on-going way via email, meetings at conferences, and phone calls.

We have also initiated collaboration with various relevant national projects, in particular:

- Belgian TERRAIN (collaboration on business models and synergies with other utility networks for NGOA); This has taken the form of several meetings, and culminated with a **Workshop on Municipal Fibre Networks** organised jointly by the two projects in Gent on 24 October 2011. The workshop was highly successful and was therefore repeated in 2012, with a the **Second Workshop on Municipal Fibre Networks** in Gent, on 15 November 2012.

- Swedish TNG-ONS (collaboration on WDM-TDM PON, with a joint journal paper published in the Journal of Optical Communications and Networks) as well as TNG-eWIN, with discussion on energy efficiency in optical backhauling of mobile access;

OASE supported TNG in a **study recently presented at Globecomm**, and we are currently discussing how to **jointly extend that work** by combining the activities in TNG on backhauling and energy consumption with OASE results on NGA architectures and techno-economics.

- ADVAntagePON (Collaboration is similar to the one regarding C-3PO.) Here, the system view between both projects is consolidated, a network view is provided from OASE into ADVAntagePON, and components feedback is provided in the opposite direction into OASE;

- ATOB: a German based field test bed in the Berlin area (with Eric Weiss coordinator) will be established to allow testing of NGOA concepts under field conditions.

3.1.8 Collaboration with other European initiatives

Contacts with other international initiatives were pursued, especially in terms of collaboration with the following initiatives:

➢ **EPIC** (European Photonics Industry Consortium) about actual component status. Mr. T.P. Pearsall, General Secretary EPIC, has already confirmed his interest to start a discussion with the OASE consortium. There is an intention to present an OASE overview at one of the next events organized by EPIC.

➢ **ETNO** (European Telecommunication Network Operator Association) for the discussion of OASE results with respect to network architecture and infrastructure enhancements. OASE has been contacted by ETNO and collaboration will be finalized.

➢ **A Memorandum of Understanding (MoU) has been signed with the FTTH Council Europe**, member organisation with a mission to accelerate FTTH deployment in Europe, (with Dr. H. Tauber, Director General of the FTTH Council Europe). The MoU aims to promote reciprocally the OASE project and the FTTH Council activities. FTTH Council Europe supported the workshop on "Deployment and Business Impact of Next Generation Optical Access" organised as an OASE open event at CTTE 2010. For the FTTH Conference 2011 organized in Milan on 9-10 February 2011, the OASE project was an associated partner which gave us the opportunity to promote the OASE project to a lot of important FTTH players. In addition, OASE also co-organised a pre-conference workshop at the FTTH Conference 2011. Furthermore, OASE Newsletters are now additionally distributed to the members of the FTTH Council Europe. This collaboration was deemed as very useful for both OASE and the FTTH Council Europe, in terms of exchange of results, experiences and view points between the European (FP7) research world and the industry world. Consequently a new MoU has been signed for 2012, which gave OASE the opportunity to display a poster at the conference; as well as discounted conference registration for all OASE members. Also, OASE work in WP6 was presented in a regular talk during the first regular session, which is a rather important honour, seldom granted to research projects.

➢ **Erisa**, the European Regions Information Society Associations in Brussels (now closed down due to financial issues and currently in talks of reformation): a large number of meetings have taken place on business models, regulations and role of public bodies; an OASE presentation was also made 27 October 2011 at one of Erisa's Round Tables, at the presence of a number of regions' representatives, as well as at Erisa's Annual

meeting in Krakow in April 2011, and at the International Workshop on ICT & Smart Economic Development on 19 April 2012.

3.1.9 Collaboration with National organisations

The Belgian Broadband platform supported OASE and IBBT in the organisation of CTTE 2010. Collaboration (mainly in terms of mutual information exchange) has also been activated with associations such as the Swedish City and Urban Network Association (SSNf), Swedish regional organisation Fiber Optic Valley (FOV), Sweden's federation of municipal and regional governments (SKL), the French State Investement Bank (Caisse de Dépot, CDC), Digital Scotland, England's Independent Networks Cooperative Associations, (INCA) Sweden's IT and telecom industry association (*IT&Telekomföretagen*), and the Swedish Broadband Alliance (SBA), Swedish Governments' Broadband Council, Information And Communication Technologies Authority (ICTA). In this framework, several OASE presentations have been held at the following meetings, e.g.:

- Region Skåne broadband association meeting

- SSNf yearly conference on Municipal Networks, *"Bredbandsbåten"*

- Strömstad's municipality council, at the presence of the municipal network

- Meeting with the municipal networks in Örebro, Karlstad and Väserås

- Interview with Swedish newspaper on public affairs, *Dagens Samhälle*

- NextGen11 (UK's platform for digital access networks development) meeting in Bristol

- Erisa annual meeting 2011

- FOV and Hudiksvall City Council meeting

- The Estonian Association Higher Education Agency participated in the joint ACCORDANCE/OASE workshop in Tallinn on 7 February 2012.

3.1.10 Project WEBSITE

A project website [http://www.ict-oase.eu] has been set-up to publicise the work and results produced within the project. This website is intended to facilitate contacts and exchanges with other research and industrial initiatives on the relevant topics. The site is being continuously kept updated about general public project information, public deliverables (which will also be made directly available for download), and other results that may be of public interest.
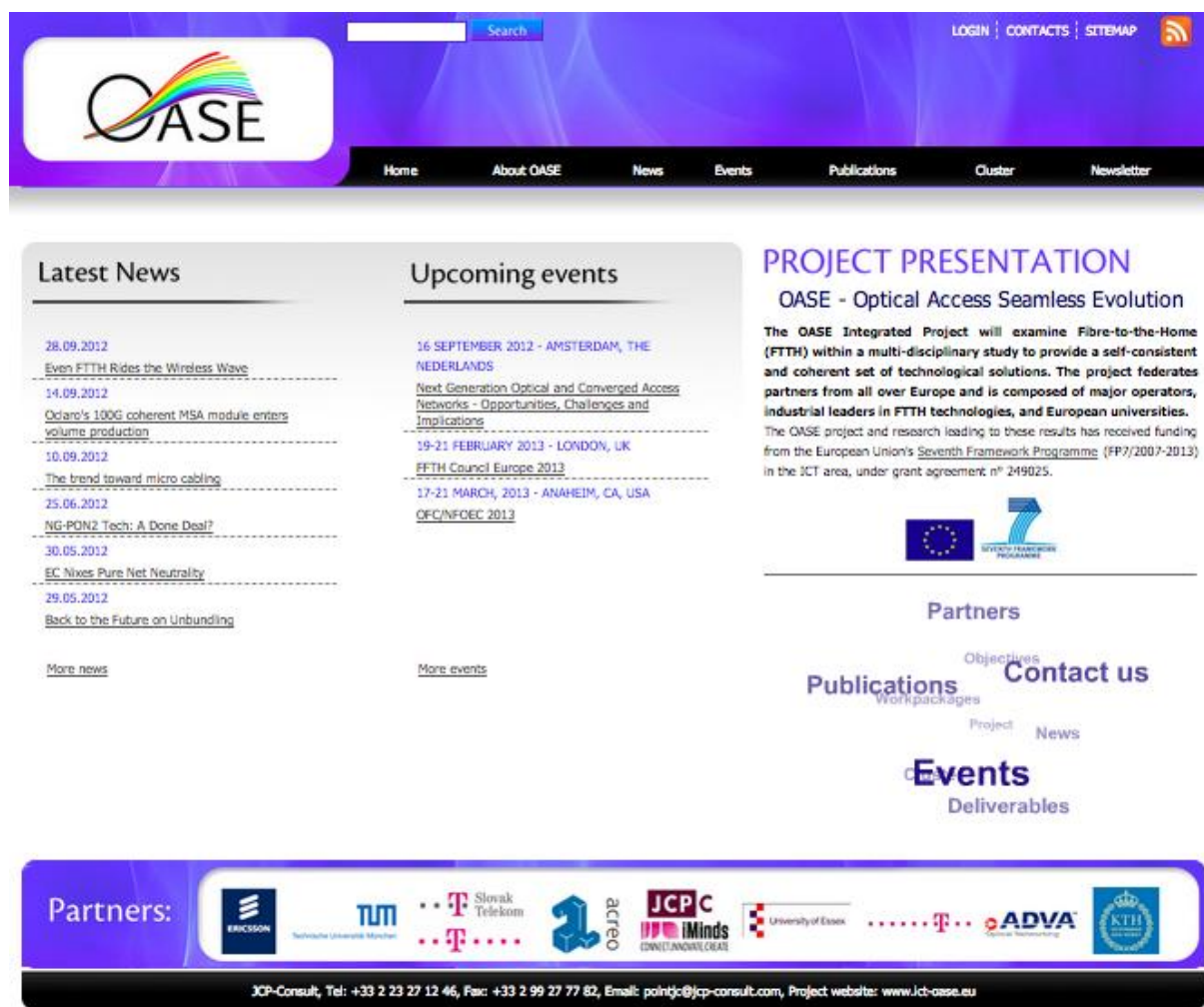
Figure 1: Upgraded OASE Website homepage

The OASE Website structure has been designed to be quite rich and provide a lot of useful functionality. The home page is divided into five principal areas: News; Events; Publications; Project presentation; and the Tag Cloud of OASE for fast and easy navigation. Most up-to-date news items have also been positioned in the left column, which is the most convenient position for viewers. News reports are updated on a regularly basis, and are strictly chosen according to their relevance. All the public deliverables have also been published on the site: http://www.ict-oase.eu/index.php?page=120&. The site provides links to relevant events in the domain, as well as the programme and minutes of the workshops organized by the consortium. Only upcoming events are showed on the homepage, but visitors can also access archive data in the events folder.

The Tag Cloud on the right is a simplified map of the web site and represents an original way to navigate directly to the pages of content of the website. But it is also possible to navigate more classically using the Tabs which also include a search string.
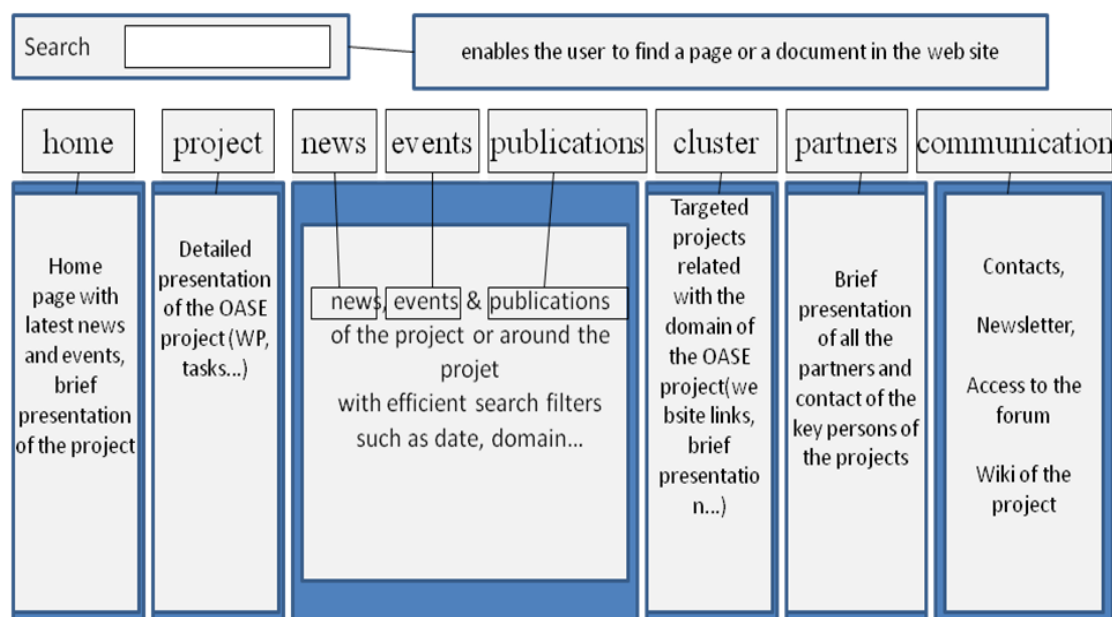
Figure 2: OASE Website structure

3.1.11 Presentations and Publications

Relevant publications like technical journals and magazines, IEEE transactions, as well as newspapers have been used to disseminate the project vision and its results. Though we generally have a focus on technical publications, we also understand the importance of addressing more commercial publications as well, since these are frequently accessed by the general public. Well over 100 publications and presentations (mostly at international peer-review conferences) have been produced during the project (M1-M36). Below is their complete list.

Moreover, as a conclusion of these highly productive three years, a white paper has been written (and will be delivered as D8.5). This will be submitted for publication on a relevant international journal (e.g. IEEE Communications Magazine) after the final approval from the reviewers.

Authors	Paper title/ Tutorial title	Name of journal, conference, etc.	Vol., no., pages, location	Date	Status
Michael Schel, Balogh Tamas	OASE Project presentation	HTE Workshop Hungary	2 Pages Power Point	Feb. 22, 2010	Accepted
D. Breuer, K. Grobe	Introduction to EU FP7 Project "OASE"	ITG Fachtagung Photonische Netze	Leipzig, Germany	May 3-4, 2010	Accepted
Claus Popp Larsen, Anders Gavler, and Kun Wang	Comparison of Active and Passive Optical Access Networks	CTTE 2010	Ghent, Belgium	Jun. 7-9, 2010	Accepted
D. Breuer, T. Monath	Long Term Research Questions in the Business	CTTE 2010, workshop	Ghent, Belgium	Jun. 9, 2010	Invited

	Case of FTTH				
C. Mattsson	Business-models for open networks	CTTE 2010, workshop	Ghent, Belgium	Jun. 9, 2010	Invited
M. Forzati, C. P. Larsen, C. Mattsson	Open access networks, the Swedish experience	ICTON 2010	Munich, Germany	Jun. 27-Jul. 1, 2010	Invited
Leonid G. Kazovsky, Gunnar Jacobsen, C. Popp Larsen, M. Popov, Dirk Breuer, Erik Weis, Christoph Lange, Shing-Wa Wong, Vinesh Gudla, Pegah Afshar.	European and American Research Toward Next-Generation Optical Access Networks (Invited paper)	ICTON 2010	Munich, Germany	Jun. 27-Jul. 1, 2010	Invited
D. Breuer, R. Hülsermann, E. Weis, C. Lange, Deutsche Telekom AG Laboratories	Impact of network reliability on network costs in next generation access networks: a first assessment (Invited paper)	ICTON 2010	Munich, Germany	Jun. 27-Jul. 1, 2010	Invited
R. Hülsermann, D. Breuer, C. Lange	Impact of network reliability on network costs in next generation access networks (Presentation)	ICTON 2010	Munich, Germany	Jun. 27-Jul. 1, 2010	Invited
Klaus Grobe, Jörg-Peter Elbers, Michael Eiselt, Markus Roppelt	WDM-PON as Alternative for NG-PON2	FSAN NG-PON2 Workshop	Munich, Germany	Sep. 1, 2010	Accepted
Koen Casier, Sofie Verbrugge, Bart Lannoo, Jan Van Ooteghem, Piet Demeesterye	Holistic approach for improving the FTTH business case	FITCE 2010	Santiago de Compostela, Spain	Sep. 1-4, 2010	Accepted
Koen Casier	Holistic approach for improving the FTTH business case (presentation)	FITCE 2010	Santiago de Compostela, Spain	Sep. 1-4, 2010	
M. Forzati, C. P. Larsen, C. Mattsen	Open access networks, the Swedish experience (national dissemination and promotion of OASE)	Stadsnäten magasinet		September 2010	Accepted

Jiajia Chen and Lena Wosinska	Reliable Overlaid PON Architecture using WDM with Shared Protection	ECOC 2010	Torino, Italy	Sep. 19-23, 2010	Accepted
Dirk Breuer, Ralf Hülsermann, Christoph Lange, Thomas Monath and Erik Weis	Architectural Options and Challenges for Next Generation Optical Access	ECOC 2010	Torino, Italy	Sep. 19-23, 2010	Invited
Dirk Breuer, Ralf Hülsermann, Christoph Lange, Thomas Monath and Erik Weis	Architectural Options and Challenges for Next Generation Optical Access (presentation)	ECOC 2010	Torino, Italy	Sep. 19-23, 2010	Invited
Zhechao Wang, Yongbo Tang, Lech Wosinski, KTH	High Efficiency Grating Couplers for Silicon-on-Insulator Photonic Circuits	ECOC 2010	Torino, Italy	Sep. 19-23, 2010	Accepted
Bart Lannoo, Koen Casier, Sofie Verbrugge, Jan Van Ooteghem	NGOA network deployments: improving the business case for existing and new actors	ECOC 2010, workshop	Torino, Italy	Sep. 19, 2010	Invited
D. Breuer, T. Monath	Research Questions in the Business Case of FTTH	ECOC 2010, workshop	Torino, Italy	Sep. 19, 2010	Invited
C. Mattsson	The point of Regulation	ECOC 2010, workshop	Torino, Italy	Sep. 19, 2010	Invited
C. Mattsson	Open networks	ECOC 2010, workshop	Torino, Italy	Sep. 19, 2010	Invited
Dirk Breuer	Next Generation Optical Access: Operator requirements and potential architectures	BROADNETS 2010, workshop	Athens, Greece	Oct. 25, 2010	Invited
Gemma Vall-llosera, Ericsson AB	WDM-PON technology for open access	BROADNETS 2010, workshop	Athens, Greece	Oct. 25, 2010	Invited
Klaus Grobe, ADVA	Performance, Cost, and Energy Consumption in Next-Generation WDM-based Access	BROADNETS 2010, workshop	Athens, Greece	Oct. 25, 2010	Invited
Sofie Verbrugge, Koen Casier, Bart Lannoo, Jan Van	Business roles and business models in Next Generation Optical Access networks	BROADNETS 2010, workshop	Athens, Greece	Oct. 25, 2010	Invited

Ooteghem					
Balázs Tarnai	Requirements and traffic dimensioning for system concepts and architecture	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
Balázs Tarnai	Requirements and traffic dimensioning for system concepts and architecture (presentation)	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
S. Verbrugge, B. Lannoo, K. Casier, G. Das	Business aspects related to next-generation optical access networks	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
S. Verbrugge, B. Lannoo, K. Casier, G. Das	Business aspects related to next-generation optical access networks (presentation)	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
Dr. Klaus Grobe	Systems Solutions for NGA	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
Dr. Dirk Breuer	Optical Access Seamless Evolution (OASE): project overview	Joint OASE / ACCORDANCE meeting, at BROADNETS 2010	Athens, Greece	Oct. 27, 2010	Invited
Klaus Grobe, Michael Eiselt, Markus Roppelt, Jörg-Peter Elbers	Properties of cyclic AWGs Market survey	FSAN Meeting	Las Vegas, USA (ARIA Resort)	Nov. 2-5, 2010	Accepted
M. Forzati	Open access networks (national dissemination and promotion of OASE)	Monthly meeting of the Optical Society of Sweden		Nov. 4, 2010	Invited
B. Skubic, J. Chen, J. Ahmed, B. Chen, L. Wosinska, B.	Dynamic Bandwidth Allocation for Long-Reach PON: Overcoming Performance Degradation	IEEE Communications Magazine	Vol. 48, no. 11, pp. 100-108	Nov. 2010	Accepted

Mukherjee					
Lech Wosinski, Zhechao Wang and Yongbo Tang, KTH	Coupling of silicon nanophotonics to the real world of optical fibers	Optics in Sweden	Lund, Sweden.	October 19-20 2010,	Invited
Lech Wosinski and Zhechao Wang, KTH	Silicon-based Devices for Computer Interconnects	IEEE ANTS 2010	Mumbai (Bombay), India	Dec. 16-18, 201	Invited
Lech Wosinski, Zhechao Wang and Yongbo Tang, KTH	Coupling of silicon nanophotonic circuits to optical fibers	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Invited
Dirk Breuer, Ralf Hülsermann, Christoph Lange, Mario Kind and Erik Weis	Optical Access Seamless Evolution (OASE) - Research towards next generation access	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Invited
C. Mas Machuca, J. Chen, and L. Wosinska	PON Protection Architectures Achieving Total Cost Reduction	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Invited
J. Chen, M. De Andrade, B. Skubic, J. Ahmed, L. Wosinska	Enhancing IPACT with Limited Service for Multi-thread DBA in Long-reach EPON	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Accepted
Kun Wang, Claus Popp Larsen, Anders Gavler, Bart Lannoo, Dominique Chiaroni, and Mikhail Popov	A Comparative Model and Techno-Economical Analysis of Next Generation AON Ethernet and TDM PON	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Accepted
Anders Gavler, Viktor Nordell, Pontus Sköldström, Claus Popp Larsen, and Kun Wang	Demonstration of a GMPLS Control Plane in an Integrated Ethernet Based Access and Distribution Network	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Accepted
Claus Popp Larsen, Anders Gavler, Kun Wang	Active optical networks – from first installations through present deployments to future architectures	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Invited

Bart Lannoo, Goutam Das, Abhishek Dixit, Didier Colle, Mario Pickavet, Piet Demeester	Flexible hybrid WDM/TDM PON: Architectures, MAC Protocols and Techno-Economic Evaluation	ACP 2010	Shanghai, China	Dec. 8-12, 2010	Invited
Bart Lannoo, Koen Casier, Sofie Verbrugge, Jan Van Ooteghem	Business aspects related to NGOA	ACP 2010, workshop	Shanghai, China	Dec. 8, 2010	Invited
Koen Casier, Sofie Verbrugge, Bart Lannoo, Jan Van Ooteghem, Piet Demeester	Improving the FTTH Business Case - Benefits of an Holistic Approach	The Journal of the Institute of Telecommunications Professionals	Vol. 5, no. 1, pp. 46-53	Jan. 2011	Accepted
Klaus Grobe, Michael Eiselt, Jörg-Peter Elbers, Markus Roppelt, ADVA	Cost, Power Budget, and Power Consumption Analysis of a Wavelength-Routed DWDM-PON	FSAN NG-PON2 Workshop,	Tokyo, Japan	Jan. 2011	Accepted
A joint contribution from EU FP7 "OASE" consortium members in FSAN: Ericsson and ADVA	Survey on Solutions for NG-PON2	FSAN NG-PON2 Workshop,	Tokyo, Japan	Jan. 2011	Accepted
Jiajia Chen and Lena Wosinska	Advances in fiber access networks development: efficient resource allocation and cost effective protection	SPIE Photonics West 2011	San Francisco, USA	Jan. 22-27, 2011	Invited
Dirk Breuer, Frank Geilhardt, Ralf Hülsermann, Mario Kind, Christoph Lange, Thomas Monath and Erik Weis	Opportunities for Next Generation Optical Access	IEEE Communications Magazine	Vol. 49, no. 2, pp. 16-24	Feb. 2011	Accepted
Klaus Grobe, Markus Roppelt, Achim Autenrieth,	Cost and Energy-Consumption Analysis of Advanced WDM-PONs	IEEE Communications Magazine	Vol. 49, no. 2, pp. 25-32	Feb. 2011	Accepted

Jörg-Peter Elbers, and Michael Eiselt, ADVA AG Optical Networking					
Jean-Charles Point (JCP-Consult)	Introduction to the European FP7 funding framework and optical access projects	FTTH Conference 2011, workshop	Milan, Italy	Feb. 8, 2011	Invited
Dirk Breuer, Erik Weis, Ralf Hülsermann, Mario Kind (DT)	Next generation optical access networks: the OASE view	FTTH Conference 2011, workshop	Milan, Italy	Feb. 8, 2011	Invited
Marco Forzati (Acreo), Sofie Verbrugge, Bart Lannoo, Koen Casier, (IBBT) Thomas Monath, Mario Kind (DT)	Business roles and business models in next generation optical access networks from an OASE perspective	FTTH Conference 2011, workshop	Milan, Italy	Feb. 8, 2011	Invited
C. Mas Machuca, J. Chen, L. Wosinska, M. Mahloo, and K. Grobe	Fiber Access Networks: Reliability and Power Consumption Analysis	15th International Conference on Optical Network Design and Modeling - ONDM 2011	Bologna, Italy	Feb. 8-10, 2011	Invited
Markus Roppelt[1,3], Felix Pohl[2], Klaus Grobe[2], Michael Eiselt[1] and Jörg-Peter Elbers[2] (ADVA 1 and 2, TUM 3)	Tuning Methods for Uncooled Low-Cost Tunable Lasers in WDM-PON	OFC2011	Los Angeles, USA	Mar. 6-10, 2011	Accepted
M. Roppelt, K. Grobe, M. Eiselt, J.-P. Elbers	Efficient Broad- and Unicast in WDM-PON	Breitbandversorgung in Deutschland	Berlin, Germany	Mar. 29-30, 2011	Accepted
M. Roppelt, K. Grobe, M. Eiselt, J.-P. Elbers (ADVA)	Investigation of wavelength control schemes in WDM-PONs	ITG Conference on Photonic Networks	Leipzig, Germany	May 2-3, 2011	Accepted

C. Mas Machuca, J. Chen, and L. Wosinska	Impact of protection to capital and operational expenditures of optical access networks	ITG Conference on Photonic Networks	Leipzig, Germany	May 2-3, 2011	Accepted
Dirk Breuer (Deutsche Telekom), Christoph Lange (Deutsche Telekom), Erik Weis (Deutsche Telekom), Michael Eiselt (ADVA), Markus Roppelt (ADVA), Klaus Grobe (ADVA), Jörg-Peter Elbers (ADVA), Stefan Dahlfort (Ericsson), Fabio Cavaliere (Ericsson), Dave Hood (Ericsson)	Requirements and Solutions for Next-Generation Access	ITG Conference on Photonic Networks	Leipzig, Germany	May 2-3, 2011	Accepted
Sofie Verbrugge, Carmen Mas Machuca, Koen Casier, Bart Lannoo, Thomas Monath, Mario Kind, Marco Forzati	Research Approach towards the Profitability of Future FTTH Business Models	Future Network & Mobile Summit 2011	Warsaw, Poland	Jun. 15-17, 2011	Accepted
Erik Weis, Dirk Breuer	Requirements and potential architectures for future converged access networks	Future Network & Mobile Summit 2011, workshop	Warsaw, Poland	Jun. 15-17, 2011	Invited
Marlies Van der Wee	Business modelling scenarios appropriate for NGOA networks and their impact on cost and functionality	Future Network & Mobile Summit 2011, workshop	Warsaw, Poland	Jun. 15-17, 2011	Invited
Abhishek Dixit, Bart Lannoo, Goutam Das,	Evaluation of flexibility in hybrid WDM/TDM PONs	1st International Symposium on Access	Yokohama, Japan	Jun. 17-19, 2011	Accepted

Didier Colle, Mario Pickavet, Piet Demeester		Spaces (IEEE-ISAS2011)			
Carmen Mas Machuca, Jiajia Chen, Lena Wosinska	Cost Dependency on Protection of Optical Access Networks for Dense Urban Areas	13th International Conference on Transparent Optical Networks (ICTON 2011)	Stockholm, Sweden	Jun. 26-30, 2011	Invited
M. Forzati, C. Mattsson, C. P. Larsen, K. Wang	The uncaptured values of FTTH	13th International Conference on Transparent Optical Networks (ICTON 2011)	Stockholm, Sweden	Jun. 26-30, 2011	Invited
Lech Wosinski and Zhechao Wang	Integrated silicon nanophotonics: a solution for computer interconnects	ICTON 2011	Stockholm, Sweden	Jun. 26-30, 2011	Invited
Abhishek Dixit, Goutam Das, Bart Lannoo, Didier Colle, Mario Pickavet, Piet Demeester	Adaptive Multi-Gate Polling with Void filling for Long-Reach Passive Optical Networks	ICTON 2011	Stockholm, Sweden	Jun. 26-30, 2011	Invited
D. Breuer	Next-generation optical access (NGOA): Key requirements and boundary conditions	ICTON 2011, OASE workshop	Stockholm, Sweden	Jun. 26-30, 2011	Invited
L. Wosinska	Architecture options for NGOA	ICTON 2011, OASE workshop	Stockholm, Sweden	Jun. 26-30, 2011	Invited
K. Grobe, A. Autenrieth	Overview and Evaluation of WDM-based Passive Optical Access Technologies	ICTON 2011, OASE workshop	Stockholm, Sweden	Jun. 26-30, 2011	Invited
D. Breuer	CAPEX assessment of NGOA concepts: Cost per line	ICTON 2011, OASE workshop	Stockholm, Sweden	Jun. 26-30, 2011	Invited
M.C. Parker, R. Martin, K. Guild, S.D. Walker	Hierarchical wireless and optical access networking: Convergence and energy efficiency	ICTON 2011, OASE workshop	Stockholm, Sweden	Jun. 26-30, 2011	Accepted
Deutsche Telekom	Slovak Telekom access network	Wholesale workshop	Presentation	Jun. 2011	

Marlies Van der Wee, Crister Mattsson, Anand Raju, Olivier Braet, Alberto Nucciarelli, Bert Sadowski, Sofie Verbrugge, Mario Pickavet	How to measure the success rate of fiber-based access networks? Evaluation of the Stokab case and comparison with other European cases.	FITCE 2011	Palermo, Italy	Aug. 31- Sep. 3, 2011	Accepted
Jiajia Chen, Lena Wosinska, Mohsan Niaz Chughtai, and Marco Forzati	Scalable Passive Optical Network Architecture for Reliable Service Delivery	Journal of Optical Communications and Networking	Vol. 3, Iss. 9, pp. 667–673	Sep. 2011	Accepted
K. Grobe, J.-P. Elbers	NG-PON2: Cost and Reach Comparison for WDM-PON w/ tunable Laser Diodes	FSAN Q3/2011 Meeting	York, UK	Sep. 6-9, 2011	Presented
K. Grobe, J.-P. Elbers	NG-PON2: Options and Cost for Tunable-Laser-based ONUs	FSAN Q3/2011 Meeting	York, UK	Sep. 6-9, 2011	Presented
Maximilian D. Schlesinger, Tobias Heger, Mario Kind	Multi-Actor Analysis for the FTTH Deployment - Potential Alliances and Pending Conflicts	22nd European Regional ITS Conference	Budapest, Hungary	Sep. 18-21, 2011	
K. Grobe, J.-P. Elbers, M. Eiselt, M. Roppelt	Combined Reach, Client-Count, Power-Consumption, and Cost Analysis of WDM-based Next-Generation	ECOC 2011	Geneva, Switzerland	Sep. 18-22, 2011	Accepted
Abhishek Dixit, Goutam Das, Bart Lannoo, Didier Colle, Mario Pickavet, Piet Demeester	Jitter performance for QoS in Ethernet Passive Optical Networks	ECOC 2011	Geneva, Switzerland	Sep. 18-22, 2011	Accepted
Marlies Van der Wee, Sofie Verbrugge, Mario Pickavet	Value Network Analysis for NGOA networks and its impact on the costs and benefits for the different actors involved	2nd PhD Seminar at the ITS conference	Budapest, Hungary	Sep. 21-22, 2011	Accepted
Koen Casier, Sofie Verbrugge, Carmen Mas Machuca	Techno-Economic Studies of Optical Networks	IEEE Photonics 2011	Arlington, Virginia, USA	Oct. 9-12, 2011	Accepted

M.C. Parker, S.D. Walker	Energy Efficiency in Next-Generation Optical Access Networks: Preliminary Results from the OASE Project	STRONGEST Workshop on Green Telecoms	Pisa, Italy	Oct. 18, 2011	Invited
Carmen Mas Machuca, Sandro Krauß, Koen Casier	Fault Management and Service Provisioning Process Model of Next Generation Access Networks	Conference on Network and Service Management	Paris, France	Oct. 24-28, 2011	Accepted
C. Mattsson, M. Forzati	Socio-economic impact of broadband: testimonial from Scandinavian city networks	Workshop on Municipal Networks	Ghent, Belgium	Oct. 24, 2011	Invited
M. Forzati, C. Mattsson	Socioeconomic return of FTTH investments, a Swedish pre-study	FTTH Forum 2011	Budapest, Hungary	Nov. 9, 2011	Invited
Deutsche Telekom	Innovation in Fixed Access Networks	Telekom Day 2011	Presentation	Nov. 10, 2011	
Deutsche Telekom	Evolution of optic and metallic access network	Telekom Day 2011	Presentation	Nov. 10, 2011	
Mozhgan Mahloo, Anders Gavler, Jiajia Chen, Stéphane Junique, Viktor Nordell, Lena Wosinska	Off-loading the aggregation networks by locality-aware peer-to-peer based content distribution	ACP 2011	Shanghai, China	Nov. 13-16, 2011	Accepted
Carmen Mas Machuca, Mozhgan Mahloo, Jiajia Chen, Lena Wosinska	Protection cost evaluation of two WDM-based next generation optical access networks	ACP 2011	Shanghai, China	Nov. 13-16, 2011	Invited
Viktor Nordell, Anders Gavler, Pontus Sköldström	BFD-triggered, GMPLS-based, multi-layer ethernet access network protection	ACP 2011	Shanghai, China	Nov. 13-16, 2011	Accepted
Carmen Mas Machuca, Orthodoxos Kipouridis, Achim Autenrieth, Klaus Grobe	Techno-economic evaluation of WDM based architectures for next-generation optical access	ACP 2011, workshop	Shanghai, China	Nov. 13-16, 2011	Invited
Achim Autenrieth, Orthodoxos Kipouridis,	Application of WDM-based PON architectures for next-generation optical access using street-aware	ACP 2011, workshop	Shanghai, China	Nov. 13-16, 2011	Invited

Klaus Grobe, Carmen Mas Machuca	infrastructure planning				
K. Grobe	NG-PON2: Components-Level Power Consumption of WDM-PON w/ tunable Laser Diodes	FSAN Q4/2011 Meeting	San Diego, USA	Nov. 15-18, 2011	
K. Grobe	NG-PON2: Cost Impact of NG-PON2 Coexistence on WDM-PON w/ tunable Laser Diodes	FSAN Q4/2011 Meeting	San Diego, USA	Nov. 15-18, 2011	
Marlies Van der Wee, Sofie Verbrugge, Mario Pickavet	Value Networks and Quantitative Social Cost-Benefit Analysis in Telecommunications Access Networks	12th FEA PhD Symposium, Ghent University	Ghent, Belgium	Dec. 7, 2011	Accepted
Abhishek Dixit, Mario Pickavet, Didier Colle	How to make video and voice less jittery?	12th FEA PhD Symposium, Ghent University	Ghent, Belgium	Dec. 7, 2011	Accepted
Abhishek Dixit, Bart Lannoo, Goutam Das, Didier Colle, Mario Pickavet, Piet Demeester	Flexibility Evaluation of Hybrid WDM/TDM PONs	IEEE ANTS 2011	Bangalore, India	Dec. 18-21, 2011	Accepted
C. Mas Machuca, J. Chen, and L. Wosinska	Total Cost Reduction Achieved by Offering Protection in PON Architectures	Telecommunication Systems			Accepted
Marilet De Andrade, Jiajia Chen, Björn Skubic, Jawwad Ahmed and Lena Wosinska	Enhanced IPACT: Solving the Over-Granting Problem in Long-Reach EPON	Telecommunication Systems			Accepted
Bart Lannoo, Goutam Das, Abhishek Dixit, Didier Colle, Mario Pickavet, Piet Demeester	Novel hybrid WDM/TDM PON architectures to manage flexibility in optical access networks	Telecommunication Systems			Accepted
Goutam Das, Bart Lannoo, Abhishek Dixit, Didier Colle, Mario	Flexible hybrid WDM/TDM PON architectures using wavelength selective switches	Optical Switching and Networking (OSN)	Vol. 9, Iss. 2, pp. 156-169	Apr. 2012	Accepted

Pickavet, Piet Demeester					
Orthodoxos Kipouridis, Carmen Mas Machuca, Achim Autenrieth, Klaus Grobe	Cost assessment of Next-Generation Passive Optical Access Networks on Real-Street Scenario	OFC/NFOEC 2012	Los Angeles, USA	Mar. 4-8, 2012	Accepted
Markus Roppelt, Michael Eiselt, Klaus Grobe and Jörg-Peter Elbers	Tuning of an SG-Y Branch Laser for WDM-PON	OFC/NFOEC 2012	Los Angeles, USA	Mar. 4-8, 2012	Accepted
Björn Skubic, Alberto Bianchi, Stefan Dahlfort, Fabio Cavaliere	Cost, Power and Performance Analysis of WDM-PON Systems Based on Reflective Transmitters for Next-Generation Optical Access	OFC/NFOEC 2012	Los Angeles, USA	Mar. 4-8, 2012	Accepted
K. Grobe, J.-P. Elbers	Overview on WDM-PON – the NG-PON2 Perspective	ITG Conf. Breitband-versorgung in Germany	Berlin, Germany	Mar. 19-20, 2012	Accepted
Marlies Van der Wee, Crister Mattsson, Anand Raju, Olivier Braet, Alberto Nucciarelli, Bert Sadowski, Sofie Verbrugge, Mario Pickavet	Measuring the success rate of fiber-based access networks. Evaluation of the Stokab case and comparison to other Western European cases	Journal of the Institute of Telecommunications Professionals (ITP)		2012 (uploaded in 2011, see comment)	Accepted
M. Forzati and C. Mattsson	The uncaptured values of FTTH	FTTH Conference 2012	Munich, Germany	Mar. 14-16 2012	Accepted
M.C. Parker, S.D. Walker	Stochastic Energy-Efficiency Optimization in Photonic Networking by use of Master-Slave Equipment Configurations	ONDM 2012	Colchester, UK	April 2012	Accepted
Orthodoxos Kipouridis, Carmen Mas Machuca, Achim Autenrieth,	Street-aware infrastructure planning tool for Next Generation Optical Access networks	ONDM 2012	Colchester, UK	April 2012	Accepted

Klaus Grobe					
Marlies Van der Wee, Koen Casier, Karel Bauters, Sofie Verbrugge, Didier Colle, Mario Pickavet	A modular and hierarchically structured techno-economic model for FTTH deployments. Comparison of technology and equipment placement as function of population density and number of flexibility points	ONDM 2012	Colchester, UK	Apr-12	Accepted
Carmen Mas Machuca, Jiajia Chen, Lena Wosinska	Cost-Efficient Protection in TDM PONs	IEEE COMMAG	vol. 50, pp. 110-117	Aug. 2012	Accepted
Mozhgan Mahloo, Carmen Mas Machuca, Jiajia Chen, Lena Wosinska	Protection cost evaluation of WDM-based Next Generation Optical Access Networks	Optical Switching and Networking (OSN)			Accepted
Lech Wosinski, Jiajia Chen and Lena Wosinska,	Si-based monolithically integrated triplexer transceiver for FTTH applications	SPIE Photonics North	Canada	June 2012	Accepted
Abhishek Dixit, Jiajia Chen, Mozhgan Mahloo, Bart Lannoo, Didier Colle and Mario Pickave	Efficient Protection Schemes for Hybrid WDM/TDM Passive Optical Networks	ICC 2012	Canada	June 2012	Accepted
Carmen Mas Machuca	Complete cost analysis of Hybrid PON architectures for Next Generation Optical Access Networks	ACP 2012	Guangzhou	Nov-12	Accepted
Carmen Mas Machuca	Energy evaluation of NGOA architectures on different deployment scenarios	ACP 2012	Guangzhou	Nov-12	Accepted
S. Verbrugge, K. Casier, C. Mas Machuca,	Business models and their costs for the next generation optical access networks	ICTON 2012	Conventry, UK	Jul-12	Accepted
Carmen Mas Machuca	NGOA cost modeling and its application to HPON cost evaluation	CTTE 2012	Athens, Greece	Jun-12	Accepted

C. Mas Machuca, K. Wang, M. Kind, K. Casier	Total Cost Comparison of Next Generation Optical Access Networks with Node Consolidation	NOC 2012	Vilanova, Spain	Jun-12	Accepted
C. Mas Machuca, K. Wang, M. Kind, K. Casier	Cost-based assessment of NGOA architectures and its impact in the business model	CTTE 2012	Athens, Greece	Jun-12	Accepted
Jawwad Ahmed, Jiajia Chen, Biao Chen, Lena Wosinska and Biswanath Mukherjee	Efficient Inter-Thread Scheduling Scheme for Long-Reach Passive Optical Networks	IEEE COMMAG			Accepted
Michele Chincoli, Luca Valcarenghi, Jiajia Chen, Paolo Monti, and Lena Wosinska	Investigating the Energy Savings of Cyclic Sleep with Service Guarantees in Long Reach PONs	ACP 2012	Guangzhou	Nov-12	Accepted
Jiajia Chen, Mozhgan Mahloo, and Lena Wosinska	Reducing the Impact of Failures in Next Generation Optical Access Networks	ACP 2012	Guangzhou	Nov-12	Accepted
Marlies Van der Wee, Menno Driesse, Bernd Vandersteegen, Pierre Van Wijnsberge, Sofie Verbrugge, Bert Sadowski, Mario Pickavet	Identifying and quantifying the indirect benefits of broadband networks: a bottom-up approach	19th ITS Biennial Conference	Bangkok, Thailand	Nov-12	Accepted
Sofie Verbrugge, Marlies Van der Wee, Maria Fernandez-Gallardo, Kristaps Dobrajs, Mario Pickavet	Some insights in regulation and potential profitability of passive fiber infrastructure in Europe	19th ITS Biennial Conference	Bangkok, Thailand	Nov-12	Accepted
M. Forzati	Socio-economic effects of FTTH/FTTx in Sweden	ICTON 2012	Coventry, UK	Jun-12	Invited

M. Forzati, C. Mattsson, S. Aal E-Raza	Early effects of FTTH/FTTx on employment and population evolution, an analysis of the 2007-2010 time period in Sweden	CTTE 2012	Athens, Greece	Jun-12	Accepted
Jiajia Chen, Patryk Urban and Lena Wosinska	Fast Fault Monitoring Technique for Reliable WDM PON: Achieving Significant Operational Saving	OFC 2013	Los Angeles, USA		Accepted
Paweł Wiatr, Jiajia Chen, Paolo Monti and Lena Wosinska	Green WDM-PONs: Exploiting Traffic Diversity to Guarantee Packet Delay Limitation	ONDM2013	Budapest, Hungary		Accepted
Ralf Huelsermann, Klaus Grobe, Dirk Breuer, Andreas Gladisch	Cost and Performance Evaluation of WDM-based Access Networks, NTh3F	OFC 2013	Los Angeles, USA		Invited
C. Mas Machuca, S. Krauß, M. Kind	Migration from GPON to Hybrid PON: Complete Cost Evaluation	Photonische Netze 2013, Mai 2013	Leipzig, Germany		Accepted

3.1.12 Workshops

To disseminate OASE results, several workshops at conferences and other events have been organized and publicly announced to gather the attention of the community.

During 2012, OASE organized two highly successful workshops at this year's ECOC:

- Next generation optical and converged access networks, Opportunities, challenges and implications
- FTTH and open access networks: Technology, business and regulatory challenges

Moreover, several papers were presented at the conference. Also, OASE will be present at the upcoming ACP conference in Canton (China) with three oral presentations.

Finally, OASE has secured an invited slot to organize a workshop at the yearly ONDM conference in Brest (16-19 April 2013). This will be the occasion to present the final project results to the scientific community. The opportunity to hold a specific OASE workshop, either combined with the final review, or as a separate general dissemination event is currently being internally discussed.

During the project (M1-M36) over 20 workshops have been proposed and held (see the full list below).

Title	Subject	Date	Location	Responsible
Workshop on "Deployment and Business Impact of Next Generation Optical Access"	Techno-economics and future business models (e.g. open access, synergies between utility providers) for FTTH rollouts, and will be an OASE open event.	Jun. 9, 2010	At CTTE 2010, Ghent, Belgium	IBBT
Workshop on "Next generation optical access networks: Architectures, technology and systems"	This workshop will provide insight in the main trends in optical access networks. From technology point of view the workshop will be devoted to next generation access technologies beyond GPON as discussed by the NG-PON1 and NG-PON2 activities within FSAN with emphasis on the longer-term NG-PON2 topics. Mainly technical aspects will be discussed.	Sep. 19-23, 2010	At ECOC 2010, Turin, Italy	DTAG
Workshop on "Next generation optical access networks: new value chains and emerging business models"	This workshop will deal with the evolving environment and the role of new business actors in optical access market. Discussion will take place by confronting the viewpoints of incumbent and alternative network operators, service and application providers, vendors, researchers and regulators.	Sep. 19-23, 2010	At ECOC 2010, Turin, Italy	Acreo / DTAG
OASE/Accordance Workshop		Oct. 27, 2010	At Broadnets 2010, Athens, Greece	JCP
Workshop on "Next generation optical access: technology and value chains"	This workshop will cover architecture and technology aspects as well as business impacts and opportunities of next generation optical access (NGOA) networks. Both technical and economical drivers will be discussed.	Dec. 8-12, 2010	At ACP 2010, Shanghai, China	DTAG / KTH

Next generation optical access technologies, from an FP7 research perspective	Status and Progress of FP7 Projects ALPHA, OASE, ACCORDANCE, SARDANA and GIGAWAM. In particular, the projects address the challenges of FTTH deployment for the near and long term perspectives, the choice of technology (active or passive) for specific scenarios, the future technologies for access such as WDMA and optical OFDMA as well as some specific technical issues.	Feb. 8, 2011	At FTTH Conference, Milan, Italy	IBBT
Workshop on "Deployment and Business Impact of Next Generation Optical Access"	Techno-economics and future business models (e.g. open access, synergies between utility providers) for FTTH rollouts, and will be an OASE open event.	May 16-18, 2011	At CTTE 2011, Berlin, Germany	VDE/DTAG
Next Generation Converged Access Networks - Opportunities, Achievements and Challenges	This workshop will provide insight in the main trends in optical access networks emphasizing fixed-mobile convergence aspects. Architecture and technology aspects will be covered as well as business-related aspects of next generation optical access (NGOA) networks.	Jun. 14, 2011	At Future Network and Mobile Summit 2011, Warsaw, Poland	DTAG (OASE / ACCORDANCE / SARDANA)

Workshop on "Green Optical Communications (GOC)"	The topics that will be addressed are (but not limited to):
	 * Energy-efficient technologies
	   o Impact of different node technologies
	   o Impact of different energy profiles: per node, per component ...
	 * Passive vs. active components
	 * Energy-efficient optical networks
	   o Access networks
	   o Core networks
	 * Energy aware networks: protocols, architectures...
	 * Impact of energy consumption on the overall OpEx and TCO.
	 * Manufacturer and operator experiences on power consumption
		Jun. 26-30, 2011	At ICTON 2011, Stockholm, Sweden	TUM/KTH

OASE Midterm Workshop at ICTON 2011	During this workshop results from the OASE project with respect to NGOA architectures, system concepts and costs were presented. Additionally, external experts from industry and academia gave their views on NGOA drivers, requirements and architectural challenges.	Jun. 26-30, 2011	At ICTON 2011, Stockholm, Sweden	KTH
Slovak Telekom access network	This workshop informed ST wholesale partners about 3 main activities: * Network transformation (Main principles of migration POTS to broadband) * FTTH/GPON solution (ST FTTH solution from WS services point of view) * ICT2009.1.1: The network of the future (Optical Access Seamless Evolution) (ST participation on EU activity in access network definition (EU FP7 OASE))	Jun. 2011	Wholesale workshop, Senec, Slovak Republic (workshop organized by ST for its wholesale partners)	ST
Workshop "Municipal Fiber Networks'	The main goal of the workshop was spreading knowledge from existing fiber network initiatives towards different players involved in potential future deployments. We tackled expected revenues as well as indirect effects, potential synergies in deployment and operations and suitable business models.	Oct. 24, 2011	Public workshop, Ghent, Belgium (http://events.ibbt.be/en/workshop-municipal-fiber-networks)	IBBT (OASE, TERRAIN, NG infra public benefits)
Evolution of optical and metallic access networks	This conference described main trends and possibilities of access networks evolution. It allowed participants to understand close connection between customer expectations, topology of network and financial aspects.	Nov. 10, 2011	TELEKOM DAY, Bratislava, Slovakia (national conference for students and teachers of Slovak Universities)	ST

Workshop on "Next Generation Optical Access Technologies and Architectures (NGOA)"	This workshop will focus on the main trends in optical access networks with respect to architecture and technology aspects and associated cost drivers. From the technology point of view different options will be considered, such as active and passive optical network approaches with different scaling limitations in terms of served customers and reach. Fixed-mobile convergence related aspects will also be highlighted. Future evolution scenarios will be elaborated and possible research directions and future access network paradigms will be outlined, motivated and discussed.	Nov. 13, 2011	At ACP 2011, Shanghai, China	DTAG / KTH
Delivering high-speed broadband through next generation networks	Gathering the key people from the European networking community to discuss about trends in next generation converged, wireless and optical networks.	Feb. 7, 2012	Public workshop, Tallinn, Estonia	JCP
Next generation optical and converged access networks – Opportunities, challenges and implications	Providing insights in the main trends in optical access networks, also including fixed-wireless convergence aspects. From system technology point of view the workshop is devoted to next generation access technologies with an emphasis on the longer-term topics. Technical and economical drivers will be discussed as well as cost estimates and related results. From a business perspective the impact of business models on network design and operation will be highlighted.	Sep. 16, 2012	At ECOC 2012, Amsterdam, the Netherlands	DTAG
FTTH and open access networks: Technology, business and regulatory challenges	Bringing up the challenges of open access and collecting possible answers and solution proposals, by confronting the viewpoints of incumbent and alternative network operators, service and application providers, vendors, researchers and regulators.	Sep. 16, 2012	At ECOC 2012, Amsterdam, the Netherlands	Acreo / IBBT

G-PON migration to new technologies	Outcomes field test migration from G-PON to WDM-PON and Hybrid-PON technologies. Presentation described migration procedure, migration time and needed resources.	Sep. 25.-26. 2012	OK2012, Prague	ST
Business modeling for NGOA	Different presentations on business models for next generation access networks, with contributions from technologists and business oriented personalities	7- 8 June 2012	CTTE 2012	IBBT
OASE Poster presentation at FTTHC	Presentation of poster at FTTHC event	14-16 Februar y 2012	FTTHC 2012	IBBT
Optical Access Seamless Evolution (ICT-OASE): Experiences, results, lessons learned	Closing workshop for the project	17 Februar y 2013	ONDM 2013	Acreo

3.1.13 Newsletters

The OASE project has distributed four newsletters which are also available on the website. The latest newsletter has been prepared during the last weeks of the project and is also being used to inform about the conclusion of the project, the main results and the concluding workshop to be held at ONDM 2013. The newsletters have been largely broadcasted though a mailing list from about 1500 emails addresses.

4. STANDARDISATION ACTIVITIES

Driving the various standardisation bodies towards a European-based standard for next-generation access was an important objective of the project. As such, the OASE industrial partners have participated in and sent contributions to meetings organised by institutions such as the IEEE, ITU-T, OIF, MEF, and especially to FSAN, which is the consensus-building forums, which is assuming a very active role within next-generation optical access.

During 2012, we have been working further on our time plan:

- Continued work in FSAN / SG15 Q2 (monitoring, contributions, this includes G.989.x (former G.ngpon2) and G.multi), and have been tracking FSAN in H2/12
- Outcome discussion from OASE technical and techno-economic studies
- Participated ITU Geneva meeting in September (focus, this time, on SG15/Q6, Metro WDM)
- Prepared a poster presentation for WDM-PON-Forum workshop, collocated with FTTH Council,
- Have been preparing next FSAN meeting to be held in Feb 2013, in Fuzhou, China

At the time being, we are facing some reluctance in standardization to adapt input from OASE, the industry partners have the intention to continue this work even after the end of

OASE. In particular, it is our goal to have further aspects of WDM-PON standardized. The industrial partners are internally discussing the best way forward.

4.1 OASE CONNECTIONS WITH STANDARDIZATION BODIES

The following partners are currently active in standardization activities:

- DTAG is actively participating in IEEE, ITU-T, OIF, MEF and FSAN forums. Deutsche Telekom is represented in FSAN by Mr. Frank Geilhardt and Mr. Andreas Templin. They work in both FSAN Task groups 'GPON interoperability' and 'Next Generation PON', as shown in the FSAN structure below.
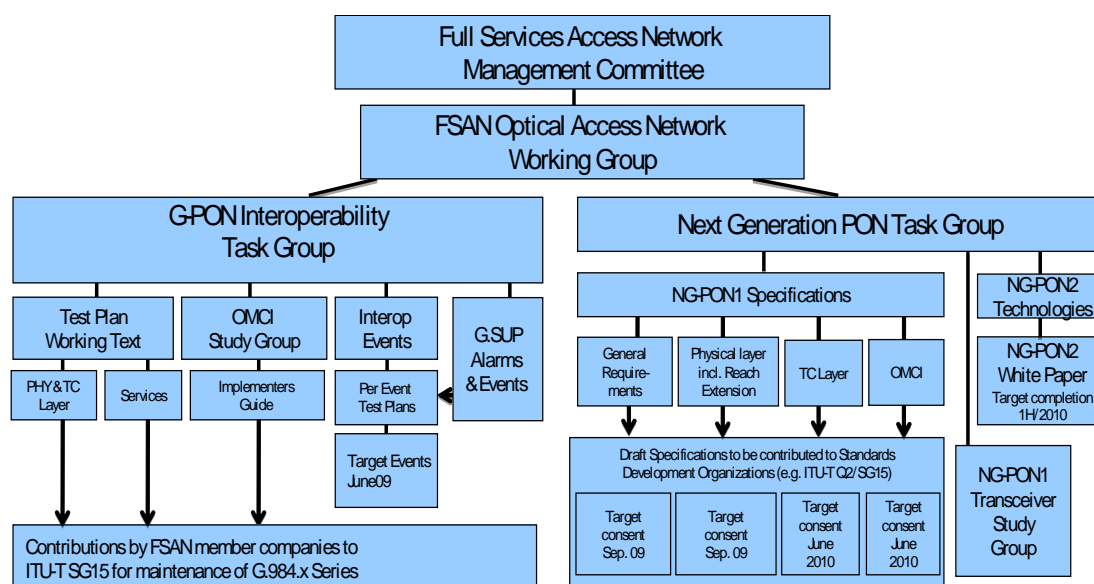

Figure 2: FSAN structure

Participation in the FSAN Operators Meetings is particularly advantageous in offering a good opportunity to contribute to the operator-driven FSAN initiative. Mr Geilhardt is a team member of OASE and has been responsible for standardization actions towards FSAN.

- Ericsson AB is actively participating in IEEE, ITU-T, OIF, MEF, and FSAN. In these contexts, the OASE members Mr Einar In de Betou and Dr Björn Skubic are part of the Ericsson back-office team for FSAN.

- ADVA is actively participating in the ITU-T SG15 Q6, FSAN, and also IEEE, MEF and IETF forums. ADVA has participated in all FSAN NG-PON2 workshops since November 2009, having its own presentations at each meeting. ADVA has also now started co-operations with various other FSAN members (Ericsson, NSN, also Huawei) in order to best support WDM-based NG-PON solutions. ADVA will be the host of the September 2011 FSAN meeting in York, UK. In addition to the FSAN activities (which are regarded as very relevant and extremely sensitive w.r.t. the FSAN timing [FSAN is about to make the NG-PON2 decision between mid-2011 and the end of 2012]) ADVA is now also actively involved in ITU-T SG15 Q6 w.r.t. the G-sdapp standardization. The aim here is to support and steer the standardization of NG access AWGs.

4.2   OASE STANDARDIZATION ACTIVITIES

DTAG has sent the following contributions to the FSAN operator group with respect to next-generation access requirements, architectures, and cost-drivers:

- ✓ Update on operator requirements
- ✓ Preparing contributions to an operator white paper (ongoing)

DTAG has also participated in different other standardization meetings or pre-standardization bodies like MEF (Metro Ethernet Forum) meetings to monitor ongoing aspects related to OASE.

Dependent on the output of the technical analysis DTAG will support and discuss requirements towards new interface functionalities through DTAG's ITU-T representatives during consensus building ITU-T meetings (as planned and defined in the DoW.) DIRK, FRANK

ADVA has been active within FSAN, IEEE, and ITU-T (A8.2.1/2), in particular by providing techno-economic analyses and business modelling inputs. During the final phase of the project, ADVA will also be presenting technology choices for NG access with technical and economic assessments (again, as defined in the DoW.)

ADVA has proactively supported standardisation, in particular through its FSAN membership, and in ITU-T SG15 Q6. In FSAN, several contributions have been made, all of which relate to OASE. This includes contributions on WDM-PON as well as excerpts from the results arising out of OASE WP4. Though it is by no means clear that FSAN will go in any direction which OASE may find most useful, it is becoming clear that input from ADVA (as a new entrant to FSAN) and in particular from the OASE project is well appreciated. This being the case, it is therefore planned to present further OASE results at FSAN, with special regard being given to the combined WP4-WP5 techno-economic results. We have also started discussions with other large European network operators, such as BT and TI, but also other relevant operators like KT. As a final input from OASE towards FSAN, ADVA has now suggested wavelength assignments and also a first set of general optical parameters. One likely outcome of this is that tunable-laser-based WDM overlay will be specified as part of NG-PON2 in the amendment of G.989.2.

EA has contributed to the standardization bodies, in particular by presenting OASE results and recommendations. In FSAN, several contributions have been made which relate to OASE, and which mainly concern WDM-PON technologies. Ericsson is also planning to present further results at FSAN related, to the techno-economic findings arising from the project.

4.3   LIST   OF   STANDARDIZATION   MEETINGS   AND   CONTRIBUTIONS UNTIL NOW

As a summary, this is a list of the targeted standardisation bodies and forums, and their associated contributions:

Date	Host(s) and venue	Meeting	Contribution
November 2009	Mitsubishi, Kyoto	FSAN Meeting Q4/2009	ADVA poster on NG-PON
February 2-4 2010	Cortina Systems, San Francisco, CA, USA	FSAN Meeting Q1/2010	ADVA contribution on WDM-PON

April 20-22 2010	Huawei, China		
August 31-September 2 2010	Nokia Siemens Networks, Munich, Germany	FSAN Meeting Q3/2010	ADVA contribution on WDM-PON DTAG contribution on requirements (FSAN operator group)
November 2010	Vitesse, Las Vegas	FSAN Meeting Q4/2010	ADVA contribution on WDM-PON
January 2011	OKI, Tokyo	FSAN Meeting Q1/2011	ADVA contribution on OASE WP4 results Joint ADVA+EA contribution on solutions for NG-PON2
May 2011	DTAG, Berlin	FSAN Meeting Q2/2011	Joint ADVA+NSN contribution on WDM-PON components, ADVA contribution on WDM-PON, EA contribution on protection for WDM-PON
June 2011	ITU, Seoul	ITU-T Q.6&7/SG15 interim meeting	EA and ADVA contribution on G.sdapp, together with ZTE and others
September 2012	ITU, Geneva	ITU Geneva meeting	Contributions by ADVA to SG15/Q6, Metro WDM (Q2 and Q6 are somewhat overlapping)
February 2013	Fuzhou, China	FSAN meeting	Two joint contributions NSN-ADVA regarding the WDM point-to-point part of NG-PON2.