Grant Agreement No.: 318600

SODALES

SOftware-Defined Access using Low-Energy Subsystems

Funding Scheme**: *Small or medium-scale focused research project STREP - CP-FP-INFSO***
Activity: **ICT-8-1.1 - Future Networks**

D6.4 Quarterly Report - 03

Due date of the Deliverable: Month 9
Actual submission date: 30th Septembre 2013
Start date of project: November 1st 2012 Duration: 36 months
Project Manager: Carlos Bock | i2CAT
Version: 1.0

Name, title and organisation of the scientific representative of the project's coordinator:

Carlos Bock, Fundació i2CAT
Tel: +34 93 553 25 10
Fax: +34 93 553 25 20
e-mail: carlos.bock@i2cat.net

Project website: http://www.fp7-sodales.eu

Project co-funded by the European Commission in the 7th Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	✓
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Abstract

The third Quarterly report (M9) describes the evolution of the SODALES project during the period comprised between months 7 and 9 of the project.

SODALES deliverables have suffered some delay due to the summer holiday period. The partners have arranged their holidays at different times and this has affected communication between the parties. The contingency plan for this has been to allocate more resources from months 9 to 12 in order to deliver all the deliverables on time.

As far as the technical objectives is concerned, no deviations from the initial schedule need to be reported. The project evolves as expected. However, the work under T1.2 and T1.3 require some adjustments to the SODALES architecture defined in MS11. This will be corrected by generating an updated version of D1.1, which will be delivered before Month 12.

Regarding the dissemination of SODALES, this 3th reporting period has been especially successful. Five papers have been accepted. An article with SODALES developments will be published in December in IEEE Communications Magazine and four conferences have also accepted contributions from SODALES.

From the management perspective, no special actions were taken during this reporting period apart from the normal project coordination. There has been no need to correct any aspect related to the management of the project.

The SODALES consortium is aware that from month 10th to month 12th the effort required to develop the project will be high, as there are several deliverables due during this period. Therefore, more resources will be allocated, specially taking into account the delay suffered during months 7th to 9th.

WP2 started in month 9 and now the number of active WPs is 5 (WP1, WP2, WP3, WP5 and WP6).

Document Revision History

Version	Date	Description of change	Authors
1.0	30/09/2013	Initial version	Carlos Bock (i2CAT)

Table of Contents

1 List of beneficiaries 1
2 Project objectives for the reporting period 2
2.1 Overall project objectives 2
2.1.1 SODALES Mission and Vision 2
2.1.2 SODALES summary of objectives 5
2.2 Project objectives for the reporting period 6
3 Work progress and achievements during the period 7
3.1 Project structure 7
3.2 Effective manpower allocated during the reporting period 8
3.3 WP1: Network and hardware architecture 9
3.3.1 Overall WP1 achievements 10
3.3.2 Individual achievements related to WP1 10
3.4 WP2: Subsystems and Physical Layer Definition 12
3.4.1 Overall WP2 achievements 13
3.4.2 Individual achievements related to WP2 13
3.5 WP3: Control Plane and Network Management 14
3.5.1 Overall WP3 achievements 15
3.5.2 Individual achievements related to WP3 15
3.6 WP5: Dissemination, Standardization & Techno-Economics 16
3.6.1 Overall WP5 achievements 17
3.6.2 Individual achievements related to WP5 18
3.7 WP6: Project management 19
3.7.1 Overall WP6 achievements 19
3.7.2 Individual achievements related to WP6 19
4 Deliverables and milestones 20
5 Dissemination activities 21

Figure Summary

SODALES interconnection service across a set of heterogeneous access infrastructures 2
SODALES interconnection service layer definition 3
SODALES global overview of its unified, massively widespread and ultra broadband access platform 4
SODALES progress in M9 8

1 List of beneficiaries

Participant no.	Participant organization name	Part. short name	Country
1 (Coordinator)	**Fundació i2CAT, Internet i Innovació a Catalunya**	**I2CAT**	**Spain**
2	Portugal Telecom Inovação	PTI	Portugal
3	Ethernity Networks	ETHERNITY	Israel
4	University of Essex	UESSEX	United Kingdom
5	Fraunhofer Gesellschaft e.V.	HHI	Germany

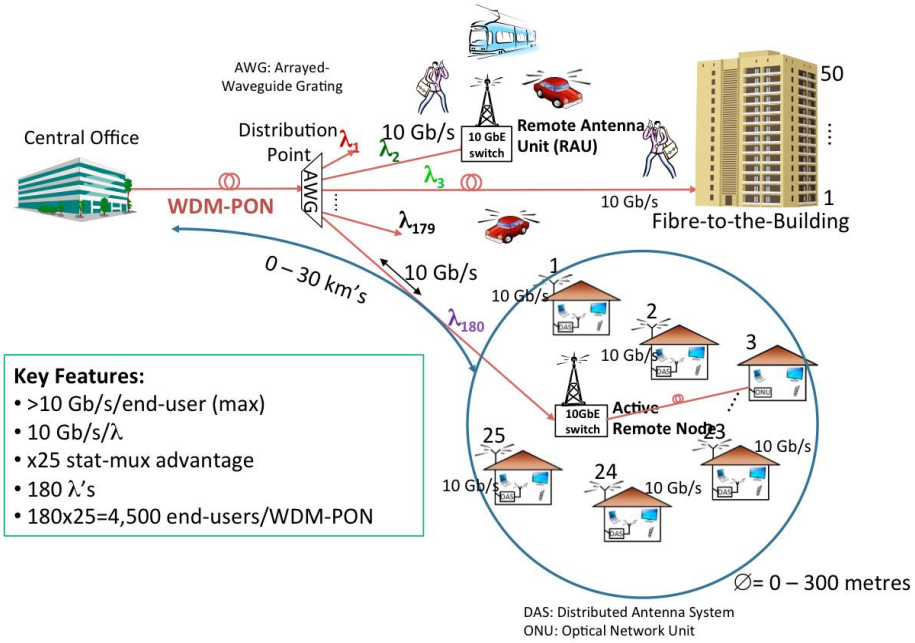
2 Project objectives for the reporting period

2.1 Overall project objectives

The SODALES project proposes a novel, converged next generation access network that combines optical and wireless access solutions to offer ubiquitous wireless / wired layer-2 access in a ground-breaking network architecture for both open access as well as traditional vertical operators.

2.1.1 SODALES Mission and Vision

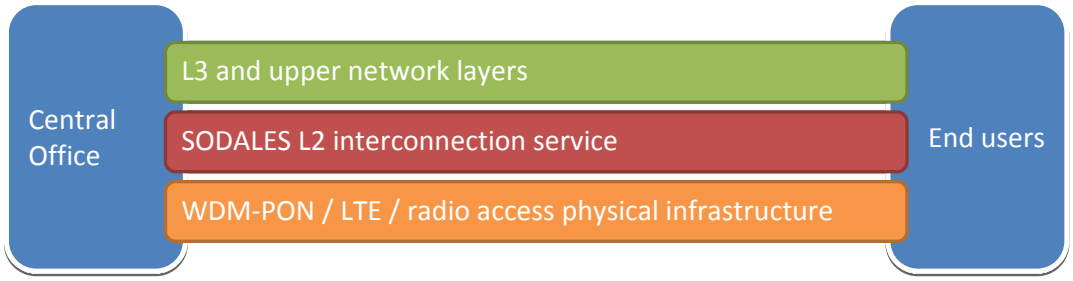
The SODALES project (SOftware-Defined Access using Low-Energy Subsystems) aims to converge Layer-2 Ethernet 2 and wireless (LTE, 60-GHz and beyond) over a unique statistical multiplexer over WDM-PON that offers interconnection to fixed and mobile subscribers in a green, simplified, optimized and easy-to-manage access infrastructure.



SODALES interconnection service across a set of heterogeneous access infrastructures

The SODALES interconnection service integrates a heterogeneous set of different access infrastructures and proposes an innovative layer-1/2 interconnection service that interfaces with the physical substrate for fixed subscribers offering a novel ultra-high bandwidth wavelength-division-multiplexed passive-optical-network (WDM-PON) architecture combined with fixed-radio

access, and also offers a standardized interface for long-term evolution (LTE) and beyond mobile users.



SODALES interconnection service layer definition

SODALES takes advantage of the fact that mobile remote base stations (RBSs) require electrical powering in order to incorporate a device called the Active Remote Node (ARN) that will perform advanced multiplexing functionalities. This allows advanced statistical multiplexing and very high network optimization, while simplifying network equipment at the customer premises.

The rationale behind this service from the business point of view is the following:

- It has been widely accepted that fibre-to-the-home (FTTH) is the only passive access infrastructure platform (backhaul, mobile- and fixed final-drop) that will be able to support present and future applications;
- To meet the fast increasing data services, mobile operators need to upgrade their network frequently and operate multiple-standard network, including GSM, WCDMA/TD-SCDMA, however this results in causing operators to have more complex and costly plans for network expansion and upgrading
- In order to achieve a viable business model, transversal infrastructure sharing is key;
- Mobility is an essential functional application, as is convergence of fixed and mobile services.
- Services are ubiquitous and need to be delivered independently of the physical substrate and final-drop segment;
- Centralized signal processing greatly reduces the number of sites for equipment room needed to cover the same areas, which will enable to handle in a more central location the support for many cellular technologies
- To reduce operational expenditure (OPEX) and capital expenditure (CAPEX), integration of wired and wireless services is essential.

Turning to future technical expectations, we are adopting the following hypotheses:

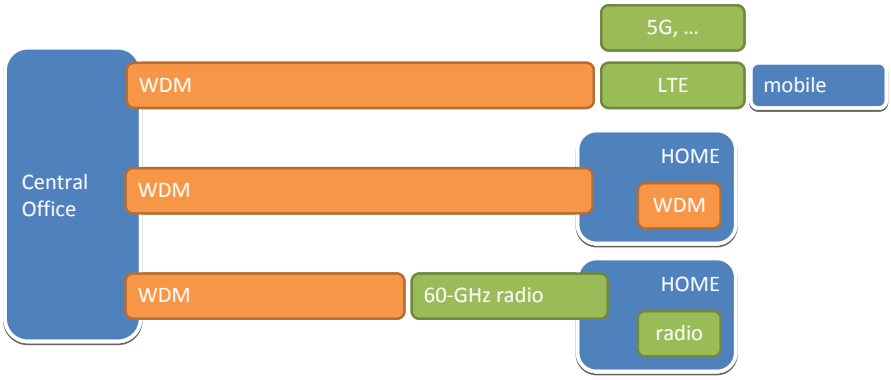
- WDM-PONs are the most-likely evolutionary next step in deployed FTTH next-generation optical access (NGOA), that are best able to offer 10 Gb/s and beyond to end-users;
- 60-GHz radio access is emerging as the key alternative technology solution for fixed access in locations where fibre is difficult (economically, logistically, topologically etc.) to deploy as the final-drop segment;
- 4G (LTE) and beyond mobile radio services will require fibre mobile backhaul infrastructure;

- To offer high data-rates in a mobile environment, the size of the coverage cells (femto/pico/micro) need to be small, with the concomitant requirement for higher numbers of remote base stations (RBSs) or active remote nodes (ARNs);
- ARNs, RBSs and antennas will require remote powering – such that the existence of small active routing elements in remote field locations is not an issue; it is even advantageous, since remote control & management (C&M) functionalities and operations become more practically possible;
- Low power consumption and energy-efficiency at all of the end-user sides, head-end and ARNs/RBSs are essential to keep ICT power consumption low and maintain a minimized carbon footprint.

In addition, the other following requirements are also becoming increasingly critical:

- Although fibre is the preferred choice when deploying new infrastructure, in brownfield sites this can often be a non-viable technical solution, so that an alternative bonding technology needs to be developed;
- Infrastructure sharing technology solutions and other associated novel business models need to be developed in order to successfully (i.e. economically sustainably) offer the massively wide-spread and ultra broadband services that European citizens are increasingly anticipating. At present, the development and deployment of such infrastructures is taking a significantly longer time than is desirable from a societal point of view, and this is also affecting European global competitiveness and productivity;
- Simplification of the provisioning and management in next-generation access (NGA), especially with the evolution towards open access networking, is key to the massively widespread deployment of ultra broadband networks and the stimulation of a dynamic and competitive environment to promote sustained technology and Internet service innovation.

Taking into account all the points listed above, SODALES aims to develop an advanced interconnection service using WDM-PON, legacy cellular technologies (GSM, WCDMA...) and 60-GHz radio for fixed users and LTE and beyond for mobile users, offering a standard L2 Ethernet-based interface to enable a multiplicity of network providers to supply services and applications across a unified access platform that will support transmission of multiple cellular wireless technologies, 60 GHz radio, and data services over economical aggregation platform.



SODALES global overview of its unified, massively widespread and ultra broadband access platform

2.1.2 SODALES summary of objectives

The fundamental SODALES objective is to develop and assess a NGOA network to offer a scalable FTTH and mobile mass market access solution, minimising TCO, supporting new business models and allowing co-operations among different stake holders, by developing compatibility and standard interfacing for fixed and mobile radio access.

The following measurable and verifiable objectives are listed, including the expected date to be achieved

Technical objectives

- MS 51 Establish the conditions of the ARN physical layer and design the ARN to fulfil compatibility with fibre and mobile access networks (Month 12)
- MS 31 Design the interfaces to offer advanced OAM at the ARN, CPE and CO to allow easy provision, control of management of bit stream access in open-access multi-operator networks (Month 12)
- MS 41 Develop a low-cost 10 Gb/s demarcation CPE that can be used for fibre and 60-GHz radio access (Month 24)
- MS 32 Include backbone network features into access systems (Month 22)
- MS 33 Offer a unified C&M plane that offers standard northbound interfaces for service provision, OAM and fault management for both, fixed and mobile services (Month 24)

Technical challenges

- MS 51 Apply statistical multiplexing adaptation to pure point-to-point standard interfaces (Month 12)
- MS 21 Solve packet-to-TDM synchronization and management issues to allow real fixed-mobile convergence (Month 12)
- MS 51 Integrate with off-the-shelf components and modules (Month 12)
- MS 42 Define, design and construct an overall prototype concept (Month 28)
- MS 12 Define physical and logical interfaces and to specify their functionalities (Month 6)
- MS 14 Determine the optimum network architecture for up- and down-stream transmission capacity (Month 18)

Demonstration and validation challenges

- MS 41 Implement the proposed solutions in an experimental prototype for evaluating the performance of the solutions as a whole (Month 24)
- MS 41 Verify operation within lab network (Month 24)
- MS 43 Test the stable prototype in a live field environment. Key factors to look at besides functional testing are ease and cost of deployment and maintenance (Month 32)
- MS 65 Provide an open specification and driving information exchange with other European operators and EU projects and contribute to Standardization bodies (Month 36)

2.2 Project objectives for the reporting period

Apart from the on-going technical work of the project, no specific milestones were planned to be achieved during the third reporting period of the project.

At present, the SODALES project has four active technical WPs

- WP1: Network and Hardware architecture
- WP2: Subsystems and Physical Layer Definition
- WP3: Control Plane and Network Management
- WP5: Dissemination, Standardisation & Techno-Economics),

further to the management WP (WP6), although WP2 just started in Month 9.

There are no milestones scheduled for this reporting period, although three technical deliverables are due in Month 9, together with the Quarterly Report for the 3rd reporting period (this document).

The development of D1.2 and D1.3 have arisen several issues related to MS12 Complete definition of the SODALES architecture and services.

This will require minor adjustments to D1.1 Architecture, service catalogue and network specifications, which will be updated accordingly.

Deliverable D3.1 has been developed without issues.

From the management perspective (WP6), there were no scheduled milestones.

3 Work progress and achievements during the period

3.1 Project structure

The SODALES work plan is structured around six major activities in order to match the project objectives:

- Analysis and technical definition of the SODALES network architecture
- Study and specification of the subsystems and the physical and switching layer
- Study and design of the SODALES control and network management plane
- Prototyping and Validation of the SODALES interconnection service in the lab and in a real environment
- Dissemination, standardization and techno-economics activities
- Coordination and project management

All work packages are organized to create a proof-of-concept platform at the end of the project, and this will be used to prototype the key challenges of the project. The following table lists the work packages (WP1 to WP6).

WP No.	WP content
WP1	Network and hardware architecture
WP2	Subsystems and physical layer
WP3	Control plane and network management
WP4	Prototypes and Validation
WP5	Dissemination, Standardisation & Techno-Economics
WP6	Project management

During this reporting period, as scheduled, the following Work Packages were active:

- WP1: Network and hardware architecture
- WP2: Subsystems and Physical Layer Definition
- WP5: Dissemination, Standardization & Techno-Economics
- WP6: Project management

	MM	11/12	12/12	01/13	02/13	03/13	04/13	05/13	06/13	07/13	08/13	09/13	10/13
	#	1	2	3	4	5	6	7	8	9	10	11	12
WP1: Network and Hardware Architecture	62			M1.1			M1.2				M1.3		
T1.1 General SODALES architecture	23						D1.1						
T1.2 ARN modeling and roadblocks	15									D1.2			
T1.3 OAM and control plane building blocks	11									D1.3			
T1.4 Simulations and validations	13												
WP2: Subsystems and Physical Layer Definition	62												M2.1
T2.1 ARN switching fabric design and interfacing	15												D2.1
T2.2 WDM/radio CPE demarcation unit	15												
T2.3 Headend L2 interface	23												
T2.4 L2 interface design for LTE and legacy services	9												
WP3: Control Plane and Network Management	47												M3.1
T3.1 Control Plane service requirements	7									D3.1			
T3.2 OAM parameters	9												D3.2
T3.3 Control Plane Design	9												D3.3
T3.4 Control Plane implementation and validation	22												
WP4: Prototypes and Validation	60												
T4.1 Prototype concept	16												
T4.2 Prototype implementation and lab validation	16												
T4.3 Lab and Field service validation	28												
WP5: Dissemination, Standardisation & TechnoEconomics	32												M5.1
T5.1 Dissemination	8												D5.1
T5.2 Standardization	11												
T5.2 Technoeconomics	13												D5.2
WP6: project management	18	M6.1											
T6.1: Establishing the project management procedures	0,5	D6.1											
T6.2: Performing the project management duties	17,5			D6.2			D6.3			D6.4			D6.5

SODALES progress in M9

Note that WP2 Subsystems and Physical Layer Definition started in M9.

3.2 Effective manpower allocated during the reporting period

Each institution has allocated the following manpower to the development of the SODALES project:

- Fundació i2CAT, Internet i Innovació a Catalunya 11.03PM
- Portugal Telecom Inovação 5.4PM
- Ethernity Networks 4PM
- University of Essex 3.6PM
- Fraunhofer Gesellschaft e.V. 2PM

This effort has been allocated in the different active WP as described in the following sections.

3.3 WP1: Network and hardware architecture

The WP1 Network and hardware architecture defines the architecture, business model and service offering of the SODALES network.

This work package has the following objectives:

- To determine the optimum network architecture and detect transmission limitations and services
- To efficiently model the Active Remote Node (ARN)
- To define the OAM and control plane requirements for an open access environment
- To define the synchronization mechanisms for legacy radio and TDM services

To achieve the objectives above, the WP1 is segmented into the following four tasks:

Task T1.1: General SODALES architecture

- Task leader: UESSEX
- Contributing partners: PTI, i2CAT, ETHERNITY and HHI
- Success criteria: A report (D1.1) that describes the SODALES devices, architecture and service catalogue

Task T1.2: ARN modeling and roadblocks

- Task leader: UESSEX
- Contributing partners: I2CAT, ETHERNITY and HHI
- Success criteria: A report that models the ARN, its technical performance (average & peak bandwidths, latencies/jitter, packet-drop ratios, modular radio interfacing, energy-efficiency & power dissipations), limitations and possible implementations.

Task T1.3: OAM and control plane building blocks

- Task leader: ETHERNITY
- Contributing partners: PTI and I2CAT
- Success criteria: A report that identifies OAM and control plane parameters relevant for an open access service operator

Task T1.4: Simulate architectures

- Task leader: I2CAT
- Contributing partners: UESSEX and HHI
- Success criteria: A report that identifies all the limitations of the SODALES architecture and the physical layer.

The global objective of WP1 is to define all the architectural and logical aspects of SODALES to feed into the WP that will implement the prototypes to demonstrate the SODALES services.

3.3.1 Overall WP1 achievements

3.3.1.1 Task T1.1: General SODALES architecture (Task Leader: UEssex)

The first project deliverable D1.1 (delivery date: M6) was successfully submitted to the Commission in July 2013 (M8). Slight lateness in the submission was due to the slow start of the project, with new partners (PTI) only starting during month M3. However, we are now catching up on the scheduled deliverable submissions.

As part of its experimental plan towards high bandwidth wireless final-drop technologies (between ONU and ARN), UEssex has been investigating 60GHz antenna design, array behaviour and beam-forming techniques.

The Task T1.1 is now complete.

3.3.1.2 Task T1.2: ARN Modeling and roadblocks (Task Leader: UEssex)

As Task Leader of T1.2 UEssex has been in charge of editing and putting together the contributions from the other project partners for the next deliverable D1.2. This was due at the end of month M9, but is now expected to be submitted during month M11. As part of the ARN modeling, UEssex has been investigating novel converged energy-efficiency metrics, and also a statistical analysis of the expected traffic characteristics for the SODALES-dimensioned ARN. HHI has been investigating optical line-of-sight final-drop technology solutions for the ARN. Ethernity is studying ARN traffic management technologies. I2CAT is focusing on the ARN open access opportunities, as well as backhaul and powering technological solutions.

3.3.1.3 Task T1.3: OAM and control plane building blocks (Leader: ETHERNITY)

Ethernity is Task Leader of T1.3, and has been liaising closely with project partners PTI and i2CAT to produce the associated deliverable D1.3. This was due in month M9, but similar to D1.2, is anticipated to be completed and submitted during month M11.

3.3.2 Individual achievements related to WP1

3.3.2.1 I2CAT

i2CAT tasks have been focussed on defining low-power optical specifications for SODALES and green powering techniques for the ARN. This comprises the definition of the required devices and interfaces in order to support the catalogue.

Also, i2CAT is interfacing the developments from WP1 with WP3 in order to develop the SODALES Control and Management plane totally aligned with the architecture and service catalogue developed in WP1.

I2CAT has actively contributed to D1.2 and D1.3 in these fields, by providing different powering source options for the ARN, resilient architectures and optical routing techniques.

I2CAT has also reviewed D1.2 before submitting it and will do the same with D1.3.

3.3.2.2 PTI

PTI involvement in WP1 has been focused on generate the full specification of the CO, ARN and CPE objects, with the interfaces and modules to interact with the hardware. Final requirements of SODALES will require to adjust MS11 and D1.1 as the initial architecture has been slightly modified.

PTI has also studied the CO to ARN connection, in order to provide synchronized services with both SYNC-E and PTP 1588v2.

Finally, PTI has reviewed different options to provice 100G services, using both WDM and coherent options.

3.3.2.3 Ethernity Networks

Ethernity contributed to the definition and creation of D1.2 and is leading the preparation of D1.3.

This includes the OAM definition and specification of the ARN and the SODALES CPE.

3.3.2.4 University of Essex

UEssex as leader of WP1 has been co-ordinating and editing the submissions of the latest deliverables D1.2 and D1.3 of the project, which have been delivered in September.

For the 4th quarter, UEssex will continue its leadership of WP1.

3.3.2.5 Heinrich Hertz Institute

HHI contributed to deliverable D1.2 on SODALES ARN Modeling and the preparation for D2.1 on ARN design and interfacing. HHI contributed specifically to chapter 3 in D1.2 on RF final drop technologies and to chapter 4 on energy efficiency.

In chapter 3, a new idea to reuse LED-based optical technologies as a potentially very low-cost and energy-efficient small-cell backhauling technology was introduced and discussed with SODALES partners. A related paper on the use of the technology for visible light communications in indoor scenarios was accepted for publication in the IEEE Communications Magazine December issue. Part of the material has been reported in D1.2.

3.4 WP2: Subsystems and Physical Layer Definition

This work package focuses on:

- The definition of physical and logical interfaces of the proposed scenarios and specification of their functionalities. In order to avoid the development of entirely new interfaces it is foreseen to reuse established and standardised interfaces (e.g. Ethernet, WDM, etc.)
- The definition of the WDM and radio interfaces
- The definition of the Layer 2 interface at the Headend to interconnect with ISPs
- The definition of the Layer 2 interface at the ARN (for LTE and legacy services)
- Provide the interfaces both, hardware and software, for the SODALES platform

WP2 is divided into four tasks, listed below:

Task T2.1: ARN switching fabric design and interfacing

Define and specify the physical layer interfaces at the ARN for WDM, especially the transceiver form factor (e.g. SFP+), the optical parameters (wavelength, power, etc.). Define and specify the Layer 2 functions required for MEF support and OAM parameters.

Task leader: UESSEX

Contributing partners: ETHERNITY and HHI

Task T2.2: WDM/radio CPE demarcation unit

Design and specify the interfaces for the WDM CPE demarcation unit and for the radio counterpart. Reuse of components will be one of the requirements in order to archive cost-effectiveness.

This demarcation unit will be totally compatible with the ARN interfaces and will offer a L2 MEF port and OAM functions to the end subscriber.

The implementation is based mainly on off-the-shelf standardized components and modules; any new design will be avoided. Implement improvements and/ or redesigns after initial test, if necessary.

The radio interface design will also be used for the ARN.

Task leader: ETHERNITY

Contributing partners: UESSEX and HHI

Task T2.3: Headend L2 interface

Define and specify the interfaces to deliver traffic to Service Providers. This interface will be at the Head End and will offer MEF specifications to the operators side and adapt the SODALES specifications downstream.

Task leader: ETHERNITY

Contributing partners: UESSEX and HHI

Task T2.4: L2 Interface Design for LTE and Legacy Services

Define and specify the interfaces to deliver traffic to L3 RBS at the ARN and also to offer an Ethernet interconnection point for legacy services (CATV, DSL technologies). This interface will offer MEF specifications to the operators' side and adapt the SODALES specifications to the SODALES network. Synchronization is required to support legacy services.

Task leader: HHI

Contributing partners: ETHERNITY and UESSEX

3.4.1 Overall WP2 achievements

WP2 is now fully active and working to achieve MS21 First design, requirements and building blocks for interfaces, scheduled for Month 12.

As the WP started in Month 9, just preliminary work has been done, which mainly comprises the organization of T2.1 in order to organize the delivery of D2.1 (also due in Month 12).

3.4.2 Individual achievements related to WP2

3.4.2.1 University of Essex

D2.1, will be due at the end of Month 12. UEssex is task leader of the task T2.1 "ARN switching fabric design and interfacing", and will be working closely with the collaborating partners, Ethernity and HHI, to ensure on-time submission of this deliverable at the end of the 1st year of the project.

3.4.2.2 Heinrich Hertz Institute

HHI has conducted a thorough planning of the work package and discussed the responsibilities with all task leaders and the members of the project team.

As WP leader, HHI will supervise the finalization of the deliverables D2.1 and D2.2. Moreover, HHI will contribute to Tasks 2.1 and 2.2.

Technically, HHI will evaluate the LED-based backhauling technology further, possibly also in cooperation with Deutsche Telekom AG. Outcomes will be reported to the consortium. A first step will be a list of requirements for the small-cell backhaul application and the cross-check how these requirements can be met by the existing technology.

3.5 WP3: Control Plane and Network Management

The objectives of this work package are:

- To define the SODALES control plane service requirements from the operator and equipment perspectives.
- To design the OAM logical interfaces to be implemented and transferred to the control and management plane for Service Operator access
- To design the complete control plane that fulfils the SODALES requirements and is able to control the SODALES equipment
- To implement and validate the proposed control and management plane

WP3 is divided in four tasks, matching the objectives presented above:

Task 3.1: Control Plane Service Requirements

This task will define the requirements from the NP perspective to efficiently design the SODALES control and management plane. This includes the full specification of the CO, ARN and CPE objects, with the interfaces and modules to interact with the hardware.

Task leader: PTI

Contributing partners: i2CAT

Task 3.2: OAM Parameters Design for E2E service delivery

This task will implement OAM parameter transmission and provision configuration from the CO, ARN and CPE to make it compatible with SODALES control plane, preserving the OAM parameters that will be transferred to the SPs for monitoring and control purposes. This task will include Northbound interface complete parameterization in order to obtain the data form the objects and transfer it to the higher level OSS/BSS systems.

Task leader: ETHERNITY

Contributing partners: I2CAT

Task 3.3: Control Plane Design

This task will specify the interface between IEEE 802.11 and UWB-PON and the interface between IEEE 802.16 and UWB-PON. The main consideration here is the frame conversion and network segmentation. The SODALES control plane needs to virtually isolate CPEs assigned to different ISPs so the can manage their customers independently form the other operators. This allows each operator to manage a slice of the network and to control de OAM parameters that they want, enhancing the control of the virtual infrastructure by the ISP. Fed by: WP3 (Task T3.1 and T3.2)

Task leader: I2CAT

Task 3.4: Control Plane Implementation and Validation

This task will take the results from the previous tasks of this WP to implement and validate the Management and Control Plane. This development will be first validated on i2CAT EXPERIMENTA facility to be later validated on SODALES lab and real network validators. SCRUM and LEAN management methodologies will be applied in order to optimize development costs and simplify the project management and reporting.

Task leader: I2CAT

Contributing partners: PTI

3.5.1 Overall WP3 achievements

During the reporting period WP3 has started its planned work on the control plane and network management in task T3.1.

The work done so far includes the definition of the control and management plane service requirements and aligned with the architecture provided in WP1. The outcomes of this task are reflected in the deliverable D3.1, which, although with a bit of delay due to the summer holiday period, has been submitted successfully on 20th Sept.

The deliverable sets the first working document of the work package and describes common practices for control and management and the requirements for the SODALES open access architecture.

3.5.2 Individual achievements related to WP3

3.5.2.1 I2CAT

As WP3 Leader, i2CAT has triggered the initial discussions for T3.1 and has participated in the edition and writing of deliverable D3.1.

Specifically, i2CAT has provided its expertise in network control and management systems trying to translate the specific requirements of SODALES architecture to general control and management issues.

i2CAT will lead the work in T3.3 to produce the control and management system design and will coordinate the WP following the progress of T3.2.

3.5.2.2 PTI

PTI has led and contributed to D3.1 by providing general information about PTI platforms in order to understand the communication schemes with the hardware that will be used in SODALES.

3.5.2.3 Ethernity

Ethernity has contributed to D3.1 with specifications of their CPE design in order to model the device to be controlled by the control and management plane that will be developed in subsequent tasks in WP3.

3.6 WP5: Dissemination, Standardization & Techno-Economics

WP5 has the following objectives:

- Disseminate the research developed in the SODALES framework
- Contribute to Standardization bodies
- Analyse the techno-economics of SODALES. Key factors to look at, besides functional testing, is ease and cost of deployment and maintenance.

WP5 is divided in three tasks, matching the objectives presented above:

Task T5.1: Dissemination

Dissemination of the work is key to give visibility to the SODALES concept. UESSEX is the leader of this task. Relevant conferences and journals are targeted to have the maximum impact in this field.

Mainly the academic partners, with small contributions from PTI, develop this task.

Task leader: UESSEX

Contributing partners: PTI, i2CAT and HHI

Task T5.2: Standardization

Due to the industrial vision of the consortium, Standardization is one of the key objectives of the SODALES initiative. This task, coordinated by ETHERNITY, contributes to Standardization bodies with the developments carried on during the research stages.

Standardization bodies and organizations like the Metro Ethernet Forum are targeted in this task.

Task leader: ETHERNITY

Contributing partners: PTI and I2CAT

Task T5.3: Techno-economics

This task analyses the SODALES concept from the economic point of view. Mainly industry driven, it analyses the SODALES blocks to find a viable business model for the commercial exploitation of the SODALES network.

Task leader: PTI

Contributing partners: ETHERNITY, I2CAT, USSEX, HHI

3.6.1 Overall WP5 achievements

At present, all tasks in WP2 are active, once the SODALES architecture was perfectly defined in Month 7.

This has been positive for the dissemination of SODALES and during this reporting period five papers have been accepted for publication.

Also, the SODALES paper, “Convergent Radio and Fibre Architectures for High-Speed Access”, was presented by the Project Co-ordinator Dr. Carlos Bock to the ICTON 2013 conference, which took place in Cartagena, Spain on June 23-27, 2013.

Dr. Bock also presented a poster paper entitled “Convergent optical-wireless network for ultra-high speed fixed and radio access” at the EC-sponsored Future Network and Mobile Summit (FuNeMs) which took place in Lisbon, July 2013.

The list of publications accepted during this reporting period is the following:

- S. Figuerola, C. Bock, J. Ferrer-Riera, E. Escalona, J. A. García-Espín, “SODALES: An Integrated Wired-Wireless Open Access Architecture”, Asia Communications and Photonics Conference (APC), 12-15 Nov 2013, Beijing, China, invited talk
- T. Quinlan, S.D. Walker, “A 60GHz, Linearly Polarised, 16dBi Coaxial Slot Array Antenna”, 2013 Loughborough Antennas & Propagation Conference, November 2013, Loughborough, UK
- L. Grobe, A. Paraskevopoulos, J. Hilt, D. Schulz, F. Lassak, F. Hartlieb, C. Kottke, V. Jungnickel, K.-D. Langer, “High-Speed Visible Light Communication Systems”, IEEE Communications Magazine, Dec. 2013
- Volker Jungnickel and Liane Grobe, “Localized SC-FDMA with constant envelope”, in Proc. IEEE PIMRC, September 2013, London, UK.
- V. Jungnickel, K. Manolakis, S. Jaeckel, M. Lossow, P. Farkas, M. Schlosser, V. Braun, “Backhaul Requirements for Inter-site Cooperation in Heterogeneous LTE-Advanced Networks”, IEEE International Conference on Communications (ICC), IEEE, Budapest, Hungary, June 2013, invited.

SODALES submission for a Networking session with the title “Converged Access Networking based on Active Remote Nodes”, which was proposed by SODALES for the ICT2013 event (Vilnius, November 2013), was rejected.

At least one paper submission to the OFC’14 conference, and submissions to other European wireless-optical conferences are anticipated.

3.6.2 Individual achievements related to WP5

3.6.2.1 I2CAT

I2CAT has been in charge of preparing the invited paper to be presented at Asia Communications and Photonics Conference (APC), which will take place in Beijing, China, in November 2013.

This is the first dissemination activity outside Europe and will help to spread the SODALES vision worldwide.

3.6.2.2 University of Essex

UESSEX has been in charge of preparing the paper about 60GHz Linearly-Polarised 16dBi Coaxial Slot Array Antennas, which has been presented in September in Loughborough, UK.

3.6.2.3 Heinrich Hertz Institute

HHI has prepared three contributions: one journal and two conferences. All of them are IEEE and the most relevant contribution is the article about High-Speed Visible Light Communication Systems that will be published in IEEE Communications Magazine in December.

3.7 WP6: Project management

WP6 Project management comprises 2 tasks, both led by i2CAT:

Task T6.1: Establishing the project management procedures

Task T6.2: Performing the project management duties

WP6 provides the internal project management and the overall co-ordination of activities, financial- and technical- planning and control. It ensures that the project objectives are met and represents the contact point of the project to the Commission, the FP7 community and the external world. It provides guidance for the process of registering IPR, especially in cases where joint ownership is involved. It also addresses any issues concerning access rights, including cases where partners join or leave the project during its duration. It is assisted in its tasks by other bodies established as part of the management structure.

3.7.1 Overall WP6 achievements

At this stage, all the initial admin requirements have been fulfilled.

All the collaboration and file sharing repositories are fully operational and I2CAT is maintaining the infrastructure to support these systems.

A face-to-face meeting was organized on 5th June 2013 in Barcelona, in order to organize the delivery of D1.1 and to coordinate the work for the next months. This was a one-day meeting hosted at i2CAT.

Additionally, weekly calls are organized in order to monitor the progress of the Project. GoToMeeting is the platform that is used for those meetings, which offers good interaction, video conference and collaboration features.

3.7.2 Individual achievements related to WP6

As i2CAT is the sole participant in WP6, all activities below are referred to i2CAT:

- Coordination of all the paperwork
- Coordination of the face-to-face meeting, held in Barcelona 5th June 2013
- Maintenance of the SODALES webpage (http://www.fp7-sodales.eu)
- Maintenance of the SODALES mailing list (sodales@i2cat.net)
- Maintenance of the SODALES weekly meetings platform, using GoToMeeting
- Organization and preparation of the meeting minutes of the weekly calls, which are organized to monitor the project evolution

4 Deliverables and milestones

During this reporting period, the following Deliverables have been prepared:

- D1.2 SODALES ARN Modeling: delivered 30th September 2013
- D1.3 SODALES OAM and Control Plane parameters for open access networks: this deliverable is about to be delivered
- D3.1 Control Plane Service RequirementsD1.1 SODALES architecture, service catalogue and network specifications: delivered 20th September 2013
- D6.4 Quarterly Report 03: this document.

5 Dissemination activities

A SODALES paper, “Convergent Radio and Fibre Architectures for High-Speed Access”, was presented by the Project Co-ordinator Dr. Carlos Bock to the ICTON 2013 conference, which took place in Cartagena, Spain on June 23-27, 2013.

Dr. Bock also presented a poster paper entitled “Convergent optical-wireless network for ultra-high speed fixed and radio access” at the EC-sponsored Future Network and Mobile Summit (FuNeMs) which took place in Lisbon, July 2013.

The SODALES proposal for a networking session with the title “Converged Access Networking based on Active Remote Nodes” was rejected for the ICT2013 event (Vilnius, November 2013).

An invited paper entitled “SODALES: An Integrated Wired-Wireless Open Access Architecture”, authored by S. Figuerola, C. Bock, J. Ferrer-Riera, E. Escalona, and J. A. García-Espín will be presented at the Asia Communications and Photonics Conference (APC), which will take place in Beijing, China in November 2013.

A SODALES paper “A 60GHz, Linearly Polarised, 16dBi Coaxial Slot Array Antenna”, authored by T. Quinlan and S.D. Walker (UEssex) has been accepted for presentation at the 2013 Loughborough Antennas & Propagation Conference, which will take place in Loughborough, UK in November 2013.

Dr. Volker Jungnickel presented the paper on Localized SC-FDMA with constant envelope to IEEE PIMRC, which will was hold in London in September 2013. Also, Dr. Jungnickel presented an invited talk about Backhaul Requirements for Inter-site Cooperation in Heterogeneous LTE-Advanced Networks at the IEEE International Conference on Communications, which was hold in Budapest in June 2013.

Finally, a journal about High-Speed Visible Light Communication Systems will be published in the December issue of IEEE Communications Magazine containing SODALES results.