

Standardization in combined wireless and wireline technologies

Introduction

GANDALF has been working in the area of *Broadband for All* in the European 6th Framework Programme and aims at demonstrating the simultaneous provision of Gigabit per second data rates to both wireline and wireless access nodes through research and development of a novel optical feeder. The optical feeder architecture makes it possible to remotely feed heterogeneous (wireline and wireless) access nodes and allows for a significant cost reduction with regard to other approaches while alleviating the bandwidth requirements at the transmitter end and simplifying the electronics at both transmitting and receiving ends. For the access nodes, low-cost optoelectronic technologies have been investigated within the project.

The proposed link configuration is compliant with core network technologies such as DWDM and optical packet switching. The offered bandwidth allows the provision of multi-service and multi-band applications satisfying future requirements of access networks to cope with the expected evolution of user and application requirements.

One of the main targets of GANDALF is to identify ongoing standards that employ modulation formats that are suitable to be deployed at both required frequency bands, or to provide prospects that allow the heterogeneous functionality the project will deliver. As pairs of standards/technologies are identified, their

simultaneous provision of required frequencies and interoperability are demonstrated both in a laboratory platform, as well as in a small field trial.

Standardization Challenge

The standardization bodies that related to the GANDALF project research and technologies were identified as EuroDOCSIS and the AT Digital Working Group of ETSI. The EuroDOCSIS standard is one of the dominant end-user broadband access techniques. Extension of this well-understood and robust technique for future wireless access capabilities was identified as a goal, in order to fulfil new network requirements. In addition, and at a later stage the project would also like to contribute to the ETSI TC BRAN specification on dual frequency band scenarios in WiMAX and HIPERACCESS systems. Standardization issues that were considered within the project include the following:

- Redefinition of the DOCSIS modulation formats
- Extension of error-correction and equalization may be required to address Quality of Service
- Extension of the standard descriptions of radio issues (radiated powers, antennas, etc)
- Modifications of the MAC layer to enable simultaneous operation in two frequency bands.



Standardization Path

ETSI has been identified as the relevant standardization body for GANDALF, and in particular the work within ETSI technical bodies: AT and BRAN. In order for GANDALF to establish a relationship with the ETSI technical bodies, the *Standards Making Process* governed by the ETSI Directives needed to be followed, which is defined by:

- ETSI Statutes
- ETSI Rules of Procedure
- ETSI Board Powers and Functions, and Working Procedures
- ETSI Technical Working Procedures

This includes the following principles, which were considered by GANDALF in its actions towards standardization:

- The Chairman of a Technical Body is responsible for the overall management, its working groups and its work programme.
- Representatives of full and associate ETSI members can participate in the work, while representatives of non-members may participate on an "exceptional and temporary" basis, if the Chairman agrees.
- Each Technical Body establishes and maintains a work programme, consisting of work items and a work item is approved by the Technical Body and then formally adopted by the whole membership.
- Most of the technical work is done via electronic means and working groups also arrange physical meetings with a usual frequency of 2 - 6 meetings per year.
- Decisions in a Technical Body are taken either by consensus or by a weighted vote – where a proposition passes if at least 71% of the votes cast are in favour.
- The Technical Body approves the output of work items as an ETSI Deliverable. In the case of ETSI Technical Specifications and ETSI Technical Reports, the Technical Body also adopts the deliverable for publication.

Interim results

ETSI TC AT declared an interest in the GANDALF project results during a first meeting. E-mail discussions between GANDALF and ETSI TC AT Chairman were arranged and these resulted in an invitation for

GANDALF to attend the next ETSI TC AT meeting in late 2005. At the same time, the possibility to contribute to the ETSI TC BRAN was also explored by GANDALF. The attendance of the GANDALF project at the next BRAN Plenary meeting was also successfully arranged with the ETSI BRAN Chairman and the ETSI BRAN Technical Officer.

GANDALF attended an ETSI BRAN meeting and submitted the contribution: "Wireline and wireless DOCSIS access networks employing radio-over-fibre fed access nodes". In this contribution a radio-over-fiber access network architecture for simultaneously feeding hybrid access nodes for wireless DOCSIS and wireline DOCSIS access networks was presented.

Key Learning Points

The ETSI BRAN feedback to the project was not very positive regarding the possible participation of GANDALF representatives to standardization activities. The conclusion was that as DOCSIS was already standardised ETSI does not need to standardise anything further as the view was that whatever GANDALF provides should be compliant with the spectrum regulation. However, GANDALF received from ETSI BRAN the recommendation to contact CEPT regarding this issue and that lead to more positive feedback from an ETSI member to participate in a CEPT working group dealing with standards coexistence in the same frequency band. The project has followed this new path. The learning point being that some investment in time is often required to identify fruitful paths towards standardization. While specific groupings may not be able to assist, the interactions are still valuable in identifying alternative paths.

GANDALF representatives also attended an ETSI AT meeting. This time the feedback was positive. The AT chairman suggested that GANDALF produce a Technical Report if the full committee agrees to create a new work item in wireless DOCSIS. Afterwards, if the work item is created, the AT grouping would encourage the project to participate in standardization activities in the subject area, and to contribute periodically. GANDALF is now in discussions with four ETSI members as required to support the new Working Item in accordance to the ETSI rules, and expects to get approval to proceed. The learning point has been that often several paths must be identified and followed in order for projects to achieve standardization objectives.