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Abstract	This document presents an alternative way of developing a standard that will allow an open and flexible physical layer.
Purpose	Discussion and decision
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Development of 802.16.3 as an open PHY standard

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Introduction

In a previous contribution to the sub10 study group [1], a suggestion to study the level of standardization was made. As the 802.16.3 PAR calls for the development of interoperability standard, this document suggests to take a "softer" way of interoperability, the way of an open PHY standard, which overcomes the difficulties presented in [1], and enables a faster track to a future proof standard.

The drawbacks of interoperability

Interoperability has many advantages, however, as shown in [1], full interoperability standards have their drawbacks:

- Long time to develop
- A conflict of interests may hinder the progress of the standard
- Performance is compromised during development of any system. The standardization process adds even more compromises, for reasons, which are not necessarily technical.
- A standard may prevent to focus on a given set of applications or deployment scenarios.
- Interoperability is not a necessity for introduction to the FWA market (in which the operating companies is the customer, and the air interface isn't but an internal system interface)

Indeed no interoperability standard for fixed wireless access system does exist today. Attempts to convert existing standards of mobile and portable equipment (such as AMPS, IS-95, GSM, DECT) for FWA have failed to overtake the market despite the advantages interoperability offers.

In the following section we suggest another way – the way of "interoperability etiquette standards".

Interoperability Etiquette Standards

With the development of soft technology such as embedded software, re-programmable devices etc. there is no need to compromise performance and define a single architecture with a single set of parameters for a full interoperability standard. Instead etiquette standards permit the use of a set of parameters and alternative architectures each is best suited for a given scenario

For a better description of etiquette standards please refer to the following paragraphs which were taken from an Internet course [2]: "Understanding Technical Standards", written by Ken Kretchmer. Mr. Kretchmer is the editor of the "Communication Standard Review" and the "Communications Standard Summary", and has participated in the development of many standards in the world of telecommunications.

"….Etiquettes are defined as protocols that do not terminate an OSI layer or layers (do not do any of the functions that the protocol normally does), but are used to negotiate some aspect of one or more OSI layers. Etiquette standards follow compatibility standards as the next strata of standards. As such, they offer some idea of where there is future economic gain…..

….Interworking with competitive products and services is a complex issue. Sometimes it creates a standards battle between the protagonists. As an example, the ADSL standard T1.413 which for several years was locked in a struggle between the proponents of two technologies: discrete multitone (DMT) and carrier-less AM PM (CAP). The net effect of this struggle was to delay the market acceptance of the ADSL concept. Eventually, DMT "won" the standard but as of the middle of 1998 had not achieved significant success in the market. An alternative approach would be to allow both DMT and CAP to exist with an etiquette to negotiate which to use. Certainly, this increases complexity, but should the goal be reduced complexity and limited sales, or to accept the complexity and make sales?…..

….Etiquettes offer considerable advantage, if designed properly, to future products and services. Compatibility is achieved when different manufactured communications devices interwork sufficiently to communicate. It is desirable to achieve compatibility in space as well as in time (future). An etiquette allows the two ends to determine common protocols and common revision levels of each protocol at the beginning of the communications. This assures compatible operation even as revisions add new features. Of course, an etiquette also allows a migration to a new protocol assuming the new devices support both new and old protocols. Over time, dual protocol devices replace the single protocol devices and the etiquette chooses the new protocol over the old protocol……
…..Revisions, Parameters, Extensions and Non Standard Facilities (NSF) are the minimum elements needed in an etiquette. The revision of the etiquette is required to allow future changes to be identified. The parameters in this case refer to the indications of the protocols (code points) supported by a specific device or system. Extensions refer to revisions or new protocols that replace previous protocols (defined in the parameters). Non-Standard Facilities (NSF) refers to a mechanism that enables a standard interface to support proprietary improvements…..
…..A tactical question relating to standards development is 'Where will the standard be used?' Is it desirable or necessary to segment the overall market by geography, industry, market type or application? Geographic segmentation of the market may be required as is the case with telephone modems which must be approved in specific areas (countries, soon to be groups of countries). Market segmentation may also be an attractive mechanism to maintain margins. Certain industries or applications require some specific features and are less sensitive to price pressure than other segments. To allow all the different kinds of segmentation, the etiquette may be designed to allow the negotiation and selection of compatible segments. Often there's additional profit to be made in segmenting markets……"

We witness today that many standards are being developed, which define many options and alternatives. See for example the set of DVB standards or the UMTS air interface standards (UTRA), in addition to the ITU-T H.323 standard and many more.

Implications to 802.16.3

Accepting this approach 802.16.3 PHY+MAC could be structured as sets of options each best fitted to its particular scenario. Those scenarios can include the service they provides (voice, multimedia, data) the platform it uses (IP, ATM, T1/E1, ISDN-BRI/PRI, etc.), the operating frequency, the available bandwidth, the propagation conditions, the deployment scenario, the market it addresses etc.. The standard would make it possible for two 802.16.3 compliant systems to negotiate the interworking protocol and establish the method and parameters for introducing equipment of one manufacturer into the network of another. On the other hand it does not have to be necessary for an 802.16.3-compliant equipment to support all the options defined in the 802.16.3 standards. Namely, it is quite possible that two pieces of compliant equipment would not be able to inter-operate (except at the negotiation level) – in particular if they were designed to address quite different applications. It is expected though that several such options are implemented within a certain piece of equipment (with base stations perhaps being more generalised, i.e. more options implemented, than terminals).

The following advantages can be identified:

- The standard will provide a more optimal solution to specific scenarios
- It will enable solutions for niche markets as well as integrated solutions, suitable for small as well as for large companies.
- This approach will shorten the time to publish and enable the introduction of 802.16.3 products sooner.
- This approach delegates the real selection to the market, rather than doing it artificially within the standardization body.
- It reduces the risks to operators as obsolete or failing products can gradually be replaced by newer/ better ones – or ones which are optimised for currently unforeseen applications.
- This approach would make the 802.16.3 an open standard, in the sense that future needs could be addressed by future technologies, which would be gradually integrated into existing 802.16.3 networks.

Suggested way forward

The way forward could be:

1. Defining and specifying common channel/s, which would serve for negotiating inter-working protocols. These channels would have to be specified in detail for interoperability for all equipment under the standard umbrella.
2. Specifying a set of scenarios, according to 802.16.3 functional requirements and the available frequency bands.
3. For the specified scenarios, suitable air interfaces shall be defined. These will be the basis for future development of 802.16.3.

Conclusions

The approach of "etiquette standard" introduced in this document offers a lot of advantages for 802.16.3 It introduces a certain level of interoperability to a field where interoperability is not an essential requirement, while avoiding the obstacles faced by developer of interoperability standards. 802.16.3 is urged to adopt and develop this approach, however it is obvious that a little time is needed to study it and appreciate its implications. It is therefore suggested to re-visit consideration of this approach at the next meeting. However, we strongly suggest to encourage contributions on possible scenarios, possible common channel interface etc.

References

[1] David Trinkwon, IEEE 80216sub10c-00/01, "Level of standardization for proposed 802.16.3 - BWA under 11 GHz"
[2] Ken Kretchmer, "Understanding Telecommunication Standards", http://www.tolu.com