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Re:	Call for comments	
Abstract		
Purpose	This document proposes a 802.16g protocol architecture model	
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# 802.16g Protocol Architectural Model

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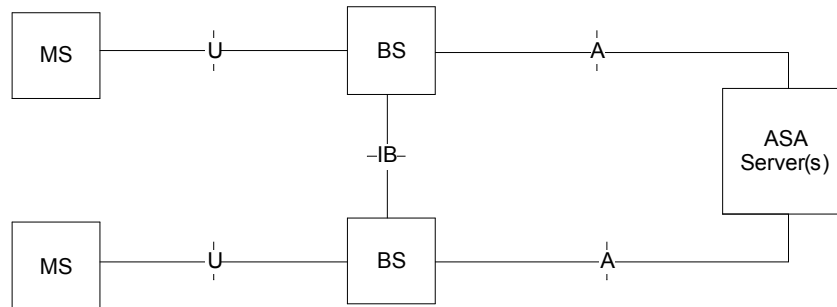
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*Ronny Kim, Beomjoon Kim, Kiseon Ryu, LG Electronics, Inc.*

## 1 Introduction

This contribution currently highlights the various network reference/architecture models defined within P802.16e, P802.16g and tries to briefly analyze the different models. It also proposes a protocol architecture model for P802.16g

## 2 802.16e Network Reference Model



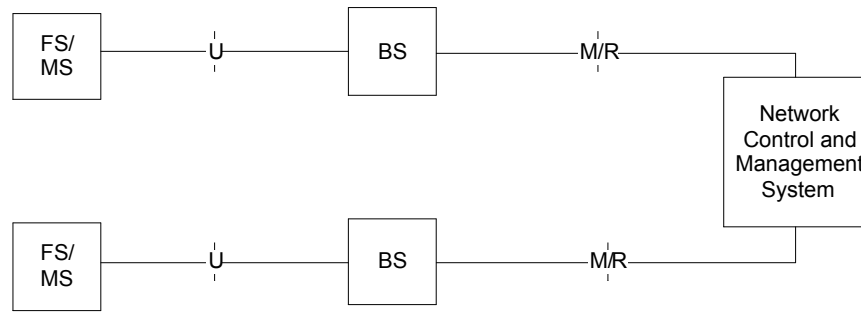
Current 802.16e Network Reference Model

Some observations:

- This model probably over simplifies the network mobility problem by depicting only the Authentication and Service Authorization Servers interfacing to the BS's over the backbone network.
- Layer 3+ protocol entities that possibly assist mobility over the air interface are not depicted.
- AAA functions are expected to be implemented over the A interface by ASA servers, the details of which are not specified.
- This model proposes an IB interface between BS's for the purposes of HO. The details of the IB interface are not specified. However, implicit reference to the IB interface between the Serving BS and the Target BS is assumed when HO flow messages are described (Annex C of [1]).
- It does not describe any specific interface between the MAC layer, and the upper layer control and management plane protocols.

Note: The base 802.16-2004 standard [2] does call out CS SAP and MAC SAP between protocol layers in Section 1.4, and briefly defines the MAC services and SAP in Annex C.

### 3 Current 802.16g Network Reference Model



Current 802.16g Network Reference Model

Some observations:

- This model also simplifies the network reference model by depicting a Network Control and Management System (NCMS) abstraction behind the BS.
- The U interface is defined for management and control over the air interface.
- The M/R interface addresses Management (M) and Radio Control (R) aspects of the BS and FS/MS by the NCMS. However the NCMS is an abstraction with the intent to abstract the network and all L3+ upper layer interfaces in a network topology agnostic manner.
- As L3+ protocol definitions are outside scope of P802.16g, the specific entities the BS communicates with at L3 are not visible at MAC layer, but they are assumed to be within the NCMS abstraction. L3+ protocols still rely on the MAC Layer (L2) primitives for their proper function.
- However as all BSs will implement L3+ protocols and the M/R interface could essentially be subsumed into the BS protocol stack, and thus the figure could be misinterpreted as M/R implying yet another protocol link layer, while it more suitable as a inter-layer protocol interface. So some clarification is needed to make this distinct.
- The current baseline P802.16g document [3] also assumes that the network services could be centrally located or distributed in the NCMS.

### 4 802.16g Protocol Architecture Model Proposal

The figure below proposes Control and Management SAPs for interfacing 802.16g to the control and management planes of the NCMS abstraction. The goal is not to define SAPs on every protocol layer interface. The intent should rather be to define SAPs that can pragmatically be used by upper layer protocols for exercising the air interface functionality at the same time allow for evolution of the air interface protocols.

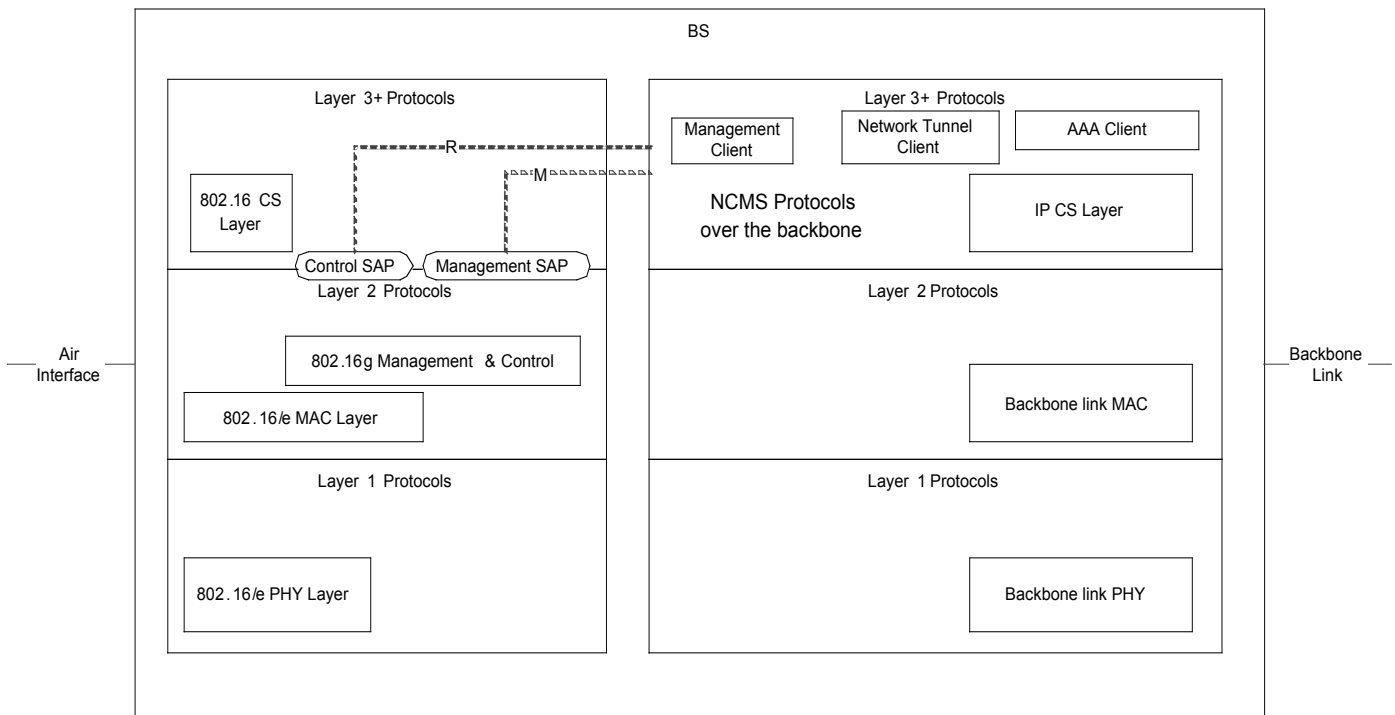


Figure x - 802.16g SAP interfaces within the BS

The control and management SAP are used for mapping to NCMS protocols over the backbone link. These SAPs provide the minimal primitives using which the L3+ protocols will be able to invoke any 802.16 MAC control or management plane protocol exchanges over the air interface. 802.16g should also define MAC Layer (L2) context info for use by L3+ protocol specifications in a network agnostic manner.

This should also clarify that the P802.16g will not define network protocol messages between BSeS and also between BSeS and NCMS internal entities as they would be out of scope. Also 802.16g will not define any SAPs for the data/bearer plane protocol aspects.

#### 4.1 Control SAP

This SAP will define primitives for all the relevant MAC management messages that are control plane related. This includes security, handoff triggers etc. to/from the upper layers.

#### 4.2 Management SAP

This will define primitives for all the MAC management messages that are management plane related. These include channel measurements, setting and getting Parameters for configuration and also statistics

#### 4.3 M/R Interfaces

The M interface as it refers to the Management SAP and the R interface refers to the Control SAP, hereon we could refer to the SAPs and these interface names M/R could be removed.

## 5 Proposed Text Changes

*[Insert the following text into sections identified]*

### 14.4 Architectural Aspects

This specification includes primitives that are exposed to upper layers in a consistent manner for use by control and management plane protocols in a network agnostic manner. The network that manages and controls an 802.16 air interface device is therefore abstracted as a Network Control and Management System (NCMS).

*[Insert the following figure into section identified]*

#### 14.4.1 Network Reference Model

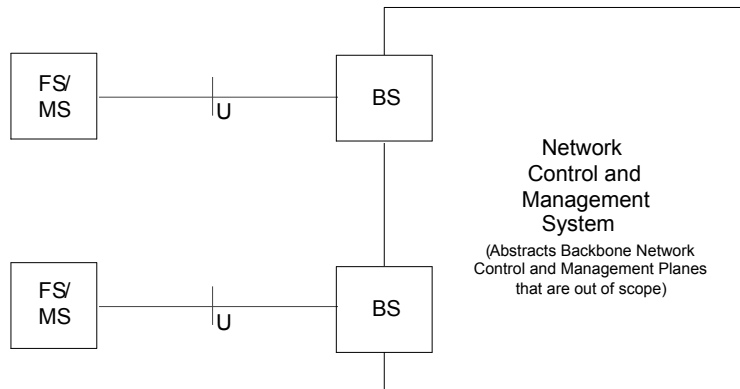


Figure 1: 802.16g Network Reference Model

*[At the end of the following section insert the following text]*

##### 14.4.1.1 Network Control and Management System (NCMS)

NCMS protocols are not defined in this specification, however information elements (IEs) and protocol primitives for these IEs are exposed using Service Access Points (SAP). This includes CS, MAC and PHY layer context information used by NCMS protocols to manage and control the air interface. Every BS is assumed to be part of an NCMS and therefore as shown in Figure 1.

*[Replace the following text into section identified]*

##### 14.4.1.1.2 BS and NCMS Interface

This interface is a set of Service Access Points (SAP) and is represented and in the Figure x1 below. It is decomposed in to two parts: the Management SAP used for Management primitives alone and the Control SAP is used for Control plane primitives that to support handovers, security context management, radio resource management, and low power operations (such as Idle mode and paging functions). The primary goal of such an interface is to ensure protocol separation.

These primitives do not define end to end protocol flows, but rather commands and indications for access to the Management and Control entities for the CS/MAC/PHY layers. Protocol procedures are defined using one or more of these primitives for performing distinct protocol functions on the air interface (eg. Paging, Handover etc.)

Management and Control entities are logical and may have SAPs between their protocol layers, however for simplicity they are not defined.

#### 14.4.1.1.2.1 Management SAP

The Management SAP may include, but is not limited to primitives related to:

- System configuration
- Monitoring Statistics
- Notifications/Triggers

#### 14.4.1.1.2.1 Control SAP

The Control SAP may include, but is not limited to primitives related to:

- Handovers (e.g. notification of HO request from MS, etc.)
- Idle mode mobility management (e.g. Mobile entering idle mode)
- Subscriber and session management (e.g. Mobile requesting session setup)
- Radio resource management, etc.

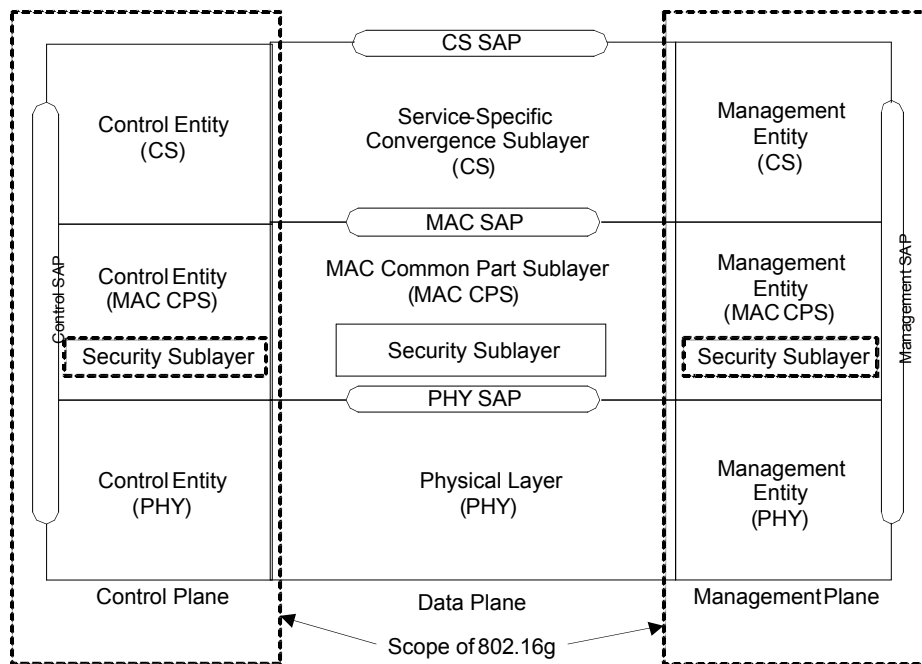


Figure x1—802.16g Protocol Architecture Model

## 6 References

- [1] IEEE P802.16e\_D6 specification
- [2] IEEE 802.16-2004 specification
- [3] IEEE P802.16g baseline document [http://ieee802.org/16/netman/docs/80216g-04\\_03r1.pdf](http://ieee802.org/16/netman/docs/80216g-04_03r1.pdf)