Project	**IEEE 802.16 Working Group**	
Title	**Proposed Tutorial on 802.16 Operator ID for IEEE Registration Authority**	
Date:	**2006-06-11**	
Source(s)	Scott Probasco scott.probasco@nokia.com Nokia 6000 Connection Drive Irving, TX 75039	As chair of ad hoc committee appointed at 802.16 Session #43 Closing Plenary, comprising Scott Probasco, Phil Barber, John Humbert, Sean Cai, Jose Puthenkulam, and Roger Marks
Re:	IEEE 802.16-06/016r3 (Letter to RAC regarding 802.16)	
Abstract	This document is the output of an 802.16 ad hoc committee, as completed on 11 June 2006, providing a draft tutorial proposal for submittal to the IEEE Registration Authority Committee. It provides alternatives for two of the options as defined in IEEE 802.16-06/016r3, with two versions of the second option.	
Purpose	As the basis of an IEEE Registration Authority to assign unique Operator IDs per IEEE Std 802.16.	
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In support of Option 1 of IEEE 802.16-06/016r3

(using existing OUI pool)

Use of the IEEE assigned Operator ID with IEEE Std 802.16 Broadband Wireless Access Standards for Wireless Metropolitan Area Networks

General

IEEE Std 802.16 defines a 24-bit number to identify the operator of an 802.16 base station. This Operator ID is combined with an additional 24-bit programmable field to define the 48-bit Base Station ID (see subclause 6.3.2.3.2 in IEEE Std 802.16). In IEEE Std 802.16, subclause 6.3.2.3.47 requires that the 24-bit Operator ID be a "Unique ID assigned to the operator."

Just as the 24-bit Operator ID uniquely identifies the operator of an IEEE 802.16 network of base stations from all other operators of IEEE 802.16 networks, in the 48-bit Base Station ID, provision for the 24-bit Operator ID assignment reserves a 24-bit block of programmable identifiers to uniquely identify each base station within one operator network.

Operator ID

A Operator ID is a sequence of 24 bits. The Organizationally Unique Identifier (OUI) is a three-octet value that is administered by the IEEE, which may be used as an Operator ID. The mapping of an OUI to the binary representation of an Operator ID is formed by taking each octet in order and expressing it as a sequence of eight bits, most significant bit (msb) to least significant bit (lsb), left to right.

For example, the OUI AC - DE - 48 could be used to generate the Operator ID:

```
              First octet      second octet     third octet
Operator ID: 1010   1100      1101   1110      0100   1000
              |       |        |       |        |       |
             msb     lsb      msb     lsb      msb     lsb
OUI:          A       C        D       E        4       8
```

Base Station ID

A Base Station ID is defined as a sequence of 48 bits. The first 24 bits take the values of the 24 bits of the Operator ID in order; the following 24 bits are administered by the Operator ID assignee. The hexadecimal representation of the Base Station ID consists of the hexadecimal

values of the six octets in order, separated by hyphens, in the order transmitted by the network application, left to right.

For example, the OUI AC - DE - 48 could be used to generate the Base Station ID:

```
    AC-DE-48-00-80-80
    |               |
    first octet    last octet
    transmitted    transmitted
```

Fields of MAC messages, which are specified as binary numbers, are transmitted as a sequence of their binary digits, starting from most significant bit (msb).

```
 1010 1100   1101 1110   0100 1000   0000 0000   1000 0000   1000 0000
 ||                                                                   |
 |next bit transmitted                                               |
 first bit transmitted                                last bit transmitted
```

Operator ID Administration

Many operators will only need a single Operator ID and therefore a single OUI. Some operators may deploy hierarchical networks, separate networks or private networks and may therefore need multiple Operator IDs, thus requiring multiple OUIs. An operator who needs multiple Operator IDs may request up to 10 contiguous OUIs.

The Organizationally Unique Identifer(s) referenced in the assignee's IEEE Registration Authority Assignment is described as a 24-bit globally assigned Operator ID and as an integral part of a 48-bit globally assigned Base Station ID. An Operator ID assignment allows the operator to generate approximately 16 million Base Station IDs, by varying the last three octets.

The method that an operator uses to ensure that no two of its Base Stations carry the same ID will, of course, depend on the assignment process, and the operator's philosophy. However, the network selection algorithms may expect Base Stations to have unique IDs. The ultimate responsibility for assuring that expectations and requirements are met, therefore, lies with the operator of the Base Station.

In support of Option 2 of IEEE 802.16-06/016r3

(Case A: using a new number pool exclusively for 802.16 Operator ID)

Use of the IEEE assigned Operator ID with IEEE Std 802.16 Broadband Wireless Access Standards for Wireless Metropolitan Area Networks

General

IEEE Std 802.16 defines a 24-bit number to identify the operator of an 802.16 base station. This Operator ID is combined with an additional 24-bit programmable field to define the 48-bit Base Station ID (see subclause 6.3.2.3.2 in IEEE Std 802.16). In IEEE Std 802.16, subclause 6.3.2.3.47 requires that the 24-bit Operator ID be a "Unique ID assigned to the operator."

Just as the 24-bit Operator ID uniquely identifies the operator of an IEEE 802.16 network of base stations from all other operators of IEEE 802.16 networks, in the 48-bit Base Station ID, provision for the 24-bit Operator ID assignment reserves a 24-bit block of programmable identifiers to uniquely identify each base station within one operator network.
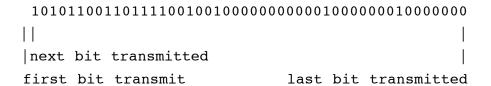
Operator ID

A Operator ID is a sequence of 24 bits. It is administered by the IEEE in a 24-bit format which is bit compliant with IEEE Std 802.16.

Base Station ID

A Base Station ID is defined as a sequence of 48 bits. The first 24 bits take the values of the 24 bits of the Operator ID in order; the following 24 bits are administered by the Operator ID assignee.

For example, the Operator ID 101011001101111001001000 could be used to generate the following Base Station ID by appending 000000001000000010000000:

```
   101011001101111001001000000000001000000010000000
  ||                                               |
  |next bit transmitted                            |
  first bit transmit              last bit transmitted
```

Operator ID Administration

Many operators will only need a single Operator ID. Some operators may deploy hierarchical networks, separate networks or private networks and may therefore need multiple Operator IDs. An operator who needs multiple Operator IDs may request up to 100 contiguous Operator IDs.

The Operator ID(s) referenced in the assignee's IEEE Registration Authority Assignment is described as a 24-bit globally assigned Operator ID and as an integral part of a 48-bit globally assigned Base Station ID. An Operator ID assignment allows the operator to generate approximately 16 million Base Station IDs, by varying the last three octets.

The method that an operator uses to ensure that no two of its Base Stations carry the same ID will, of course, depend on the assignment process, and the operator's philosophy. However, the network selection algorithms may expect Base Stations to have unique IDs. The ultimate responsibility for assuring that expectations and requirements are met, therefore, lies with the operator of the Base Station.

In support of Option 2 of IEEE 802.16-06/016r3

(Case B: using a new number pool, shared with other uses)

Use of the IEEE assigned Operator ID with IEEE Std 802.16 Broadband Wireless Access Standards for Wireless Metropolitan Area Networks

General

IEEE Std 802.16 defines a 24-bit number to identify the operator of an 802.16 base station. This Operator ID is combined with an additional 24-bit programmable field to define the 48-bit Base Station ID (see subclause 6.3.2.3.2 in IEEE Std 802.16). In IEEE Std 802.16, subclause 6.3.2.3.47 requires that the 24-bit Operator ID be a "Unique ID assigned to the operator."

Just as the 24-bit Operator ID uniquely identifies the operator of an IEEE 802.16 network of base stations from all other operators of IEEE 802.16 networks, in the 48-bit Base Station ID, provision for the 24-bit Operator ID assignment reserves a 24-bit block of programmable identifiers to uniquely identify each base station within one operator network.

Operator ID

A Operator ID is a sequence of 24 bits. The 802 Operator Identifier (8OI) is a three-octet value that is administered by the IEEE, which may be used as an Operator ID. The mapping of an 8OI to the binary representation of an Operator ID is formed by taking each octet in order and expressing it as a sequence of eight bits, most significant bit (msb) to least significant bit (lsb), left to right.

For example, the 8OI AC - DE - 48 could be used to generate the Operator ID:

```
              First octet      second octet    third octet
Operator ID: 1010   1100      1101   1110     0100   1000
              |       |        |       |       |       |
             msb     lsb      msb     lsb     msb     lsb
  8OI:        A       C        D       E       4       8
```

Base Station ID

A Base Station ID is defined as a sequence of 48 bits. The first 24 bits take the values of the 24 bits of the Operator ID in order; the following 24 bits are administered by the Operator ID assignee. The hexadecimal representation of the Base Station ID consists of the hexadecimal values of the six octets in order, separated by hyphens, in the order transmitted by the network application, left to right.

For example, the 8OI AC - DE - 48 could be used to generate the Base Station ID:

```
        AC-DE-48-00-80-80
         |                    |
first octet         last octet
transmitted          transmitted
```

Fields of MAC messages, which are specified as binary numbers, are transmitted as a sequence of their binary digits, starting from most significant bit (msb).

```
   1010 1100   1101 1110   0100 1000   0000 0000   1000 0000   1000
0000
    ||
|
    |next bit transmitted
|
first bit transmitted                                    last bit
transmitted
```

Operator ID Administration

Many operators will only need a single Operator ID and therefore a single 8OI. Some operators may deploy hierarchical networks, separate networks or private networks and may therefore need multiple Operator IDs, thus requiring multiple 8OIs. An operator who needs multiple Operator IDs may request up to 100 contiguous 8OIs.

The 802 Operator Identifer(s) referenced in the assignee's IEEE Registration Authority Assignment is described as a 24-bit globally assigned Operator ID and as an integral part of a 48-bit globally assigned Base Station ID. An Operator ID assignment allows the operator to generate approximately 16 million Base Station IDs, by varying the last three octets.

The method that an operator uses to ensure that no two of its Base Stations carry the same ID will, of course, depend on the assignment process, and the operator's philosophy. However, the network selection algorithms may expect Base Stations to have unique IDs. The ultimate responsibility for assuring that expectations and requirements are met, therefore, lies with the operator of the Base Station.