Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
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Re:	Call for technical proposals 802.16j-07~~6~~/007r2~~34~~
Abstract	This contribution provides a technical proposal for the RS network entry procedure for the case of a non-transparent RS. It is based on reusing many of the stages executed in the SS network entry procedure with the only major change being the introduction of new SBC and REG TLV values to enable exchange of information about PHY & MAC features supported by the RS. It also defines how the RS switches from using the access link to using the relay link following successful registration with the MR-BS.
Purpose	For discussion and approval of inclusion of the proposed text into the P802.16j baseline document.
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RS network entry procedure

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Introduction

This contribution provides a technical proposal for the network entry procedure to be followed by the MR-BS or RS to enable an RS to enter the MR enabled network.

The proposed procedure is based on reusing as much of the procedure currently defined in the IEEE Std. 802.16 for the purpose of SS network entry.

The current IEEE Std. 802.16 SS network entry procedure is illustrated in Figure 1 for reference.

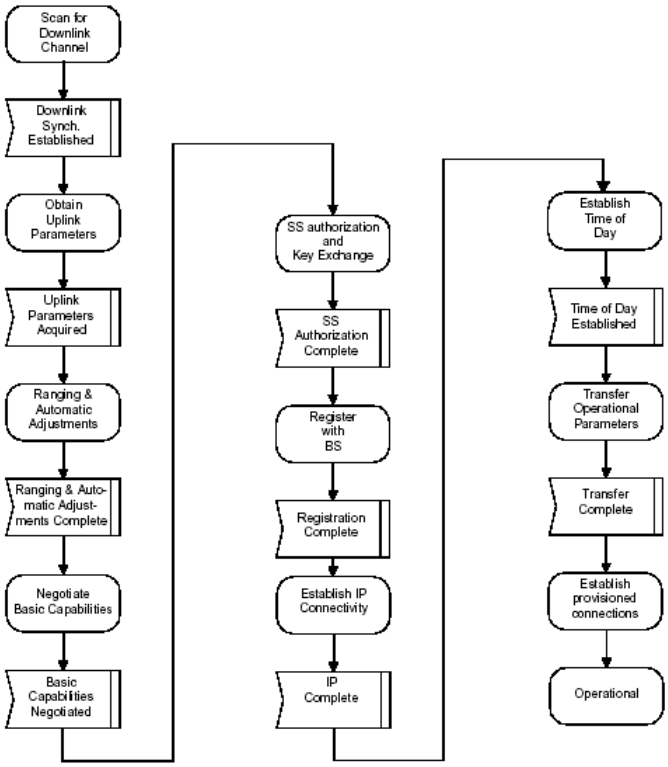

Figure 1. IEEE Std. 802.16 SS network entry procedure.

Overview of proposed procedure

It is assumed that the network could consist of some IEEE Std. 802.16 BS and some MR-BS. It is also assumed that a MR-BS may be operating in a legacy mode until it receives a request from an RS for it to enter the network. The reason the BS may operate in such a mode would be to preserve transmission resources.

However, it is proposed that the MR-BS will at least broadcast the MAC version support TLV [1] indicating its capability to support the IEEE 802.16j MAC in the DCD message. The RS will then be able to identify that the BS is in fact an MR-BS at an early stage in the network entry procedure and decide whether to continue once it learns whether it is attempting to connect to a BS or MR-BS.

The RNG process will be unchanged from the used for SS network entry, the only change being that the RS will indicate support of IEEE 802.16j through the MAC version support TLV. The MR-BS will respond indicating that it can support IEEE 802.16j.

Similarly in the SBC process, a new RS capability TLV is[are] defined to indicate basic capabilities of the RS to the BS. This TLV will identify the type of relay (i.e. transparent, non-transparent, centralized scheduling, distributed scheduling) and also any other MR-BS or RS related features required to support the RS. This TLV is defined in this proposal. By placing it in SBC it allows the RS to abort connection if it finds that fundamental basic parameters are not supported.

~~In this proposal whether RS performs authorization is left FFS.~~

~~The next step where there is some modification is in the REG stage. In this case new TLVs may be signaled [2] and it is proposed that the secondary management connection is not created to the RS.~~

~~Once registered the RS network entry is essentially completed then in the case of a non-transparent RS, the MR-BS (or superordinate RS) shall allocate the relay zone(s) in the DL and UL subframes. The MR-BS (or superordinate RS) will include the IEs used to define relay zone(s) in the DL/UL-MAP in the first access zone. This will inform the RS existence, location and format of the relay zone(s), if it is not already being transmitted. The RS will then receive the R-MAP messages in the same frame in the first downlink relay zone interval. After reception of the information in the R-MAPs, the RS shall stop receiving the access link interval in subsequent frames, and when it is ready to start supporting SS connections, will transmitting its own preamble, FCH and broadcast MAC messages (as applicable) on the access link. The SS can then enter the network through the RS using the SS network entry procedure. Note this last stage is not included in this proposal, but it is expected that the frame structure and associated signaling support contributions will cover this issue explicitly in the standard.~~

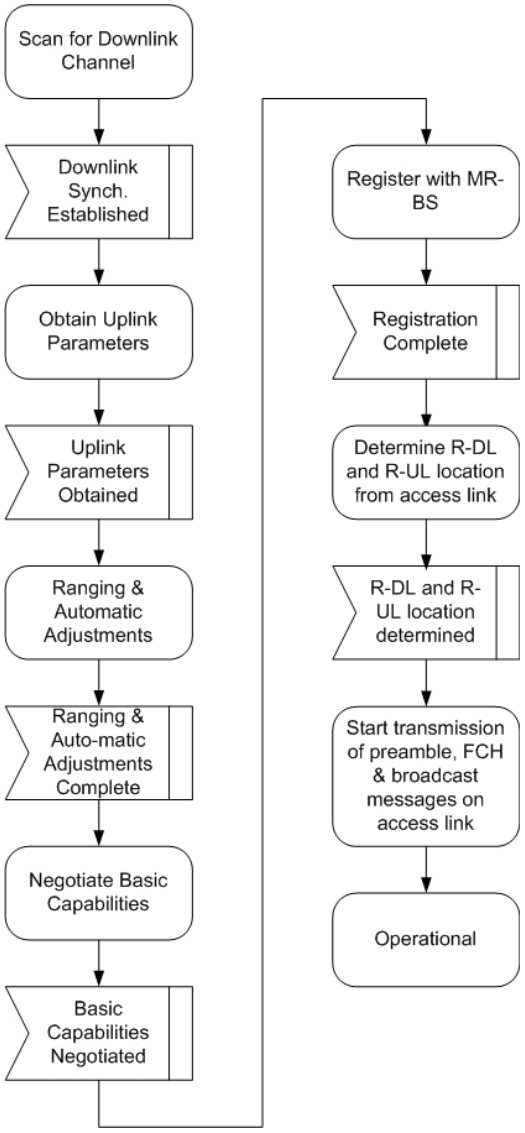

Figure 2. RS network entry procedure.

Proposed text changes

[Modify the last row in Table 14 in page 46 as follows]

Type	Message name	Message description	Connection
~~62-255~~ 67	RS_Config-REQ	RS configuration request message sent by RS	Basic
68	RS_Config-RSP	RS configuration response message sent by MMR-BS	Basic
69-255		Reserved	

6.3.2.3.23 SS and RS Basic Capability Request (SBC-REQ) message

[Change the text in the first paragraph as indicated:]

The SS SBC-REQ shall be transmitted by the SS or RS during initialization. An SS or RS shall generate SBC-REQ messages in the form shown in Table 51.

[Insert the following text at the end of 6.3.2.3.23:]

An RS shall generate SBC-REQs including the following parameter:

> **Basic CID** *(in the MAC Header)*
> The CID in the MAC Header is the Basic CID for this RS, as assigned in the RNG-RSP message.

All other parameters are coded as TLV tuples.

Basic Capability Requests contain those RS Capabilities Encodings (11.8) that are necessary for effective communication with the RS during the remainder of the initialization protocols. ~~Only the following parameters shall be included in the Basic Capabilities Request:~~

~~**Physical Parameters Supported** (see 11.8.3)~~
~~**Bandwidth Allocation Support** (see 11.8.1)~~

6.3.2.3.24 SS or RS Basic Capability Response (SBC-RSP) message

[Insert the following text before the last sentence:]

An MR-BS shall generate SBC-RSPs in the form shown in Table 52, including both of the following parameters:

> **CID** *(in the MAC Header)*
> The CID in the MAC Header is the Basic CID for this RS, as appears in the RNG-REQ message.

The following parameters shall be included in the SBC-RSP if found in the RS SBC-REQ:

> **Physical Parameters Supported** (see 11.8.3)
> **Bandwidth Allocation Support** (see 11.8.1)
> The MR-BS response to the subset of RS capabilities present in the SBC-REQ message. The MR-BS responds to the RS capabilities to indicate whether they may be used. If the MR-BS does not recognize an RS capability, it may return this as “off” in the SBC-RSP.

Only capabilities set to “on” in the SBC-REQ may be set “on” in the SBC-RSP, as this is the handshake indicating that they have been successfully negotiated.

[Add new sections 6.3.2.3.62 and 6.3.2.3.63 after section 6.3.2.3.61 in page 172]

6.3.2.3.62 RS configuration request message

This message may be transmitted by a MR-BS for the purpose of RS configuration. A RS may use this message to report information to facilitate the determination of a MR-BS on configuration of RS operation parameters.

Table XXX. RS_Config-REQ message format.

Syntax	Size	Notes
RS_Config-REQ format {		
_Management message type = 67	8 bits	
_TLV	Variable	
}		

6.3.2.3.63 MR-BS configuration response message

This message shall be transmitted by a RS-. A MR-BS shall use this message to set operation parameters for a RS. MR-BS can transmit this message as a response to RS_Config-REQ or as an unsolicited message.

Syntax	Size	Notes
RS_Config-RSP format {		
_Management message type = 68	8 bits	
_TLV		
}		

6.3.9 Network entry and initialization

[Change the first paragraph as indicated:]

Systems shall support the applicable procedures for entering and registering a new SS or RS or a new node to the network. All network entry procedures described hereunder through and including 6.3.9.13 apply only to PMP operation and PMP operation with MR support. The network entry procedure for Mesh operation is described in 6.3.9.14.

[Insert the following text after the second paragraph:]

The procedure for initialization of an RS shall be as shown in Figure xxx55. For the RS the stages c), g), h), i) and j) are not required, for all other stages the RS shall behave in the same manner as an SS during network entry unless otherwise specified in the subclauses of 6.3.9. The more detailed finite state machine representations of the individual sections (including error paths) and the timeout values shall be the same as those provided for the SS, unless otherwise specified.

[*Insert the following figure*]

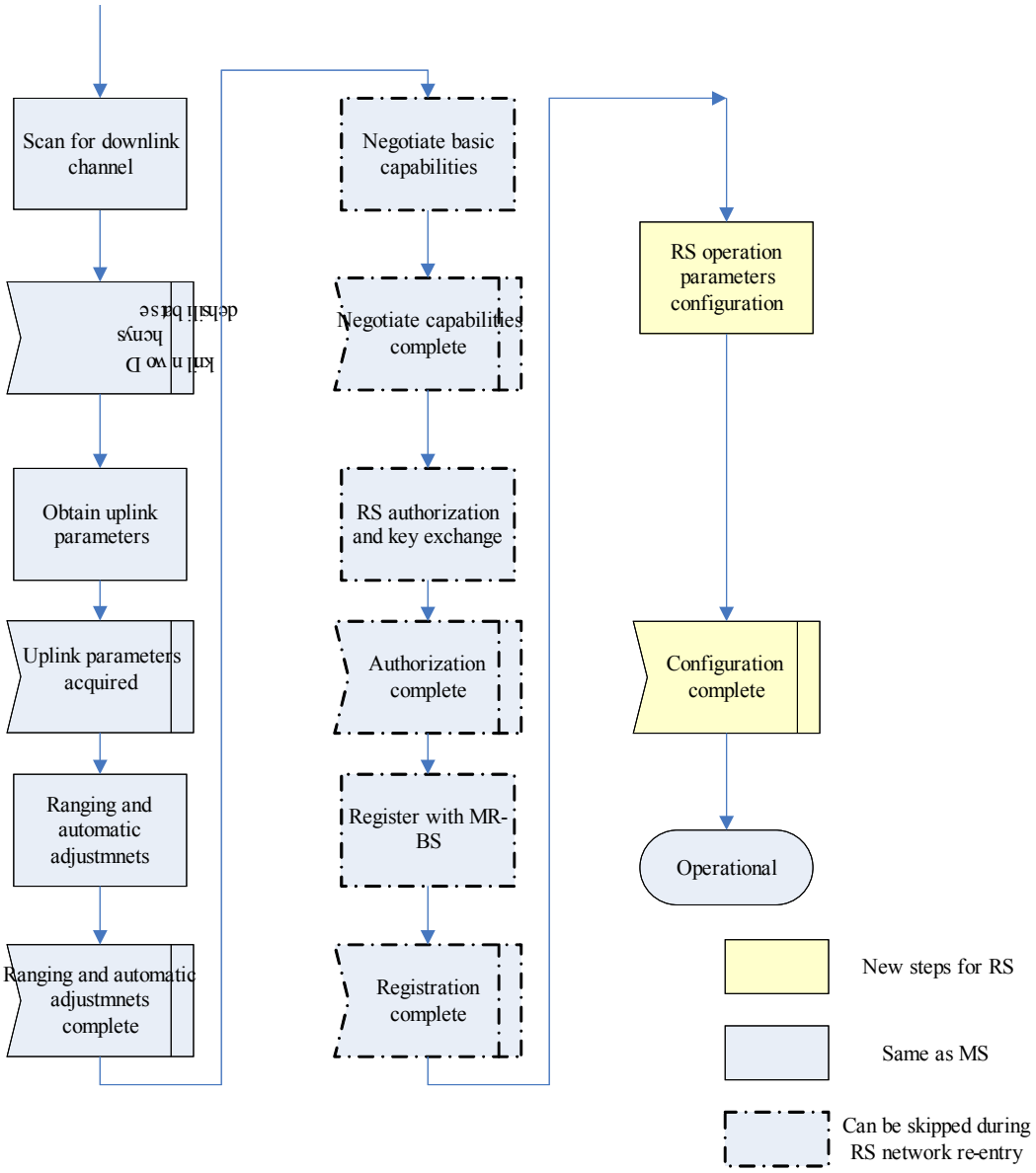

Fig. xxx RS initialization overview

6.3.9.16.x. Relay station operational parameter configuration

In MR networks, a RS operational parameter configuration procedure may required after RS registration procedure. This procedure allows a RS to obtain necessary operational configuration parameters that must be configured over-the-air. One example of such parameters is the frame start beginning preamble index (802.16e preamble) configuration since the configuration of such parameters usually requires radio environment measurement of a RS. During this procedure, RS and M~~M~~R-BS shall use RS configuration request /response message (RS_Config-REQ/RSP) to negotiate the configuration. A ~~R~~MR-BS shall ~~send RS_Config-REQ message to suggest parameter configuration(s) to its associated MMR-BS. The MMR-BS shall~~ determine the parameter configurations and indicate to the RS using RS_Config-REQ~~SP~~ message. After configuration, the RS responds RS_Config-RSP to the MR-BS. Before this relay station operational parameter configuration procedure, MR-BS may need to authenticate the entering RS by `addmission control.`

The parameters configured during this procedure include:

• 802.16e frame start preamble index for a relay station which is configured to transmit 802.16e frame start preamble

Change the table in subclause 11.1.3 as indicated:

Type	Length	Value	Scope
148	1	Version number of IEEE 802.16 supported on this channel. 1: Indicates conformance with IEEE Std 802.16-2001 2: Indicates conformance with IEEE Std 802.16c-2002 and its predecessors 3: Indicates conformance with IEEE Std 802.16a-2003 and its predecessors 4: Indicates conformance with IEEE Std 802.16-2004 5: Indicates conformance with IEEE Std 802.16-2004 and IEEE Std 802.16e-2005 6: Indicates conformance with IEEE Std 802.16-2004, IEEE Std 802.16e-2005 and IEEE Std 802.16j-xxxx ~~5~~6-255: *Reserved*	PMP: DCD, RNG-REQ MESH: REG-REQ, REG-RSP

[Insert new subclause 11.8.3.7.20]

11.8.3.7.20 MR PHY feature support

This TLV indicates the MR PHY features supported by the RS and the MR-BS.

Type	Length	Value	Scope
Xx	1	Bit #0: Access zone preamble transmission support Bits #1-7: *Reserved*	SBC-REQ SBC-RSP

[Insert new subclause 11.7.27]

11.7.27 MR MAC feature support

This TLV indicates the MR features supported by the RS and the MR-BS.

Type	Length	Value	Scope
Xx	1	Bit #0: RS scheduling support Bit #1: NBR-ADV generating Bit #2: Tunneling packet mode support Bit #3: Tunneling burst mode support Bit #4: RS mobility support Bit #5: Child RS network entry support Bit #6-7 : *Reserved*	REG-REQ REG-RSP

11.8.3.8 MR specific parameters

[Insert the following text:]
This TLV indicates the MR

Type	Length	Value	Scope
TBA	1	Bit #0: Transparent relaying Bit #1: Non-transparent relayingAccess zone preamble transmission support Bit #12: RS Centralized schedulingscheduling support Bit #3: Distributed scheduling Bit #24: NBR-ADV generating Bit #35: Tunneling support Bit #46 : RS Mmobility sSupport Bit #5: Child RS network entry support Bit #6-7 : *Reserved*	SBC-REQ SBC-RSP

References

[1] Hart, M., "MAC version encoding TLV for .16j", IEEE C802.16j-06/139, IEEE 802.16 meeting #46, Dallas, November 2006.
[2] Oleszczuk, A., "Registration messages for centralized-scheduler relay station", IEEE C802.16j-06/152, IEEE 802.16 meeting #46, Dallas, November 2006.
[3] Hart, M., "Signaling support for two-hop and multihop frame structure", IEEE C802.16j-07/013, IEEE 802.16 meeting #47, London, January 2007.
[4] Okuda, M., "MS network entry for non-transparent Relay Station", IEEE C802.16j-06/133, IEEE 802.16 meeting #46, Dallas, November 2006.