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| Source(s) | Hang Zhang, Peiying Zhu, Mo-Han Fong, Wen Tong,  David Steer, Gamini Senarath, Derek Yu, Mark Naden, G.Q. Wang<br><br>Nortel<br>3500 Carling Avenue<br>Ottawa, Ontario K2H 8E9 | Voice: +1 613 7631315<br>[mailto:wentong@nortel.com]<br><br>[mailto:pyzhu@nortel.com] |
|---|---|---|
| | Kanchei (Ken) Loa, Yi-Hsueh Tsai, Shiann-Tsong Sheu, Hua-Chiang Yin, Chih-Chiang Hsieh, Yung-Ting Lee, Frank C.D. Tsai, Heng-Iang Hsu, Youn-Tai Lee<br><br>Institute for Information Industry<br>8F, No. 218, Sec. 2, Dunhua S. Rd.,<br>Taipei City 106, Taiwan, ROC. | loa@nmi.iii.org.tw |

| Re: | A response to a Call for Technical Proposal, http://wirelessman.org/relay/docs/80216j-06_027.pdf |
|---|---|

| Abstract | This contribution proposes additional operations required for a RS, such as path selection operation, operation parameter configuration and mode switching operation. |
|---|---|

| Purpose | To incorporate the proposed text  into the P802.16j Baseline Document (IEEE 802.16j-06/026r1) |
|---|---|

| Procedures | applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>. |
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# RS Initial Network Entry

*Hang Zhang, Peiying Zhu, Mo-Han Fong, Wen Tong,  David Steer, Gamini Senarath, Derek Yu, Mark Naden, G.Q. Wang*

**Nortel**

## 1   Introduction

When a relay station initially enters a network, most of initial network operations are the same as MS does. However, some additional operations may be required for a RS, such as path selection operation, operation parameter configuration and mode switching operation. Those operations are special to RS and shall be defined in the standard.

## 2   RS initial network entry proposal

We propose the RS initial network entry as shown in Figure 1. Compared with MS initial network entry, three operation steps are added:

- *Access point attachment (path) negotiation*
  This procedure enables a RS and the MRBS to negotiate the initial access point attachment of this RS. This operation happens after UL parameter automatic adjustment complete and before basic capability negotiation. During this operation a relay station is allowed to report to the MRBS the radio environment measurements. The MRBS is allowed to make final decision regarding the access point attachment selection (e.g., serving station selection).  In order to support this operation, we suggest either reuse RNG-REQ/RSP message with a new TLV added in RNG-REQ message or introduce a new message called as RS_path request/response. The benefit by putting this procedure right after the ranging is to avoid path update after the initial network entry since the path update requires certain signaling exchanges between MRBS and RSs in the path
- *Relay station operation parameter configuration*
  This procedure allows a RS to obtain necessary operation configuration parameters that must be configured over-the-air. One example of such parameters is the frame beginning preamble (802.16e preamble) configuration since the configuration of such parameters usually requires radio environment measurement of a RS.  To enable this procedure, we suggest to introduce a new MAC management message – RS configuration request /response message (RS_Config-REQ/RSP).
- *MS mode to RS Mode Switch*
  At mode switch action time (the action time is negotiated during the relay station operation configuration procedure), a RS starts the RS normal operation.
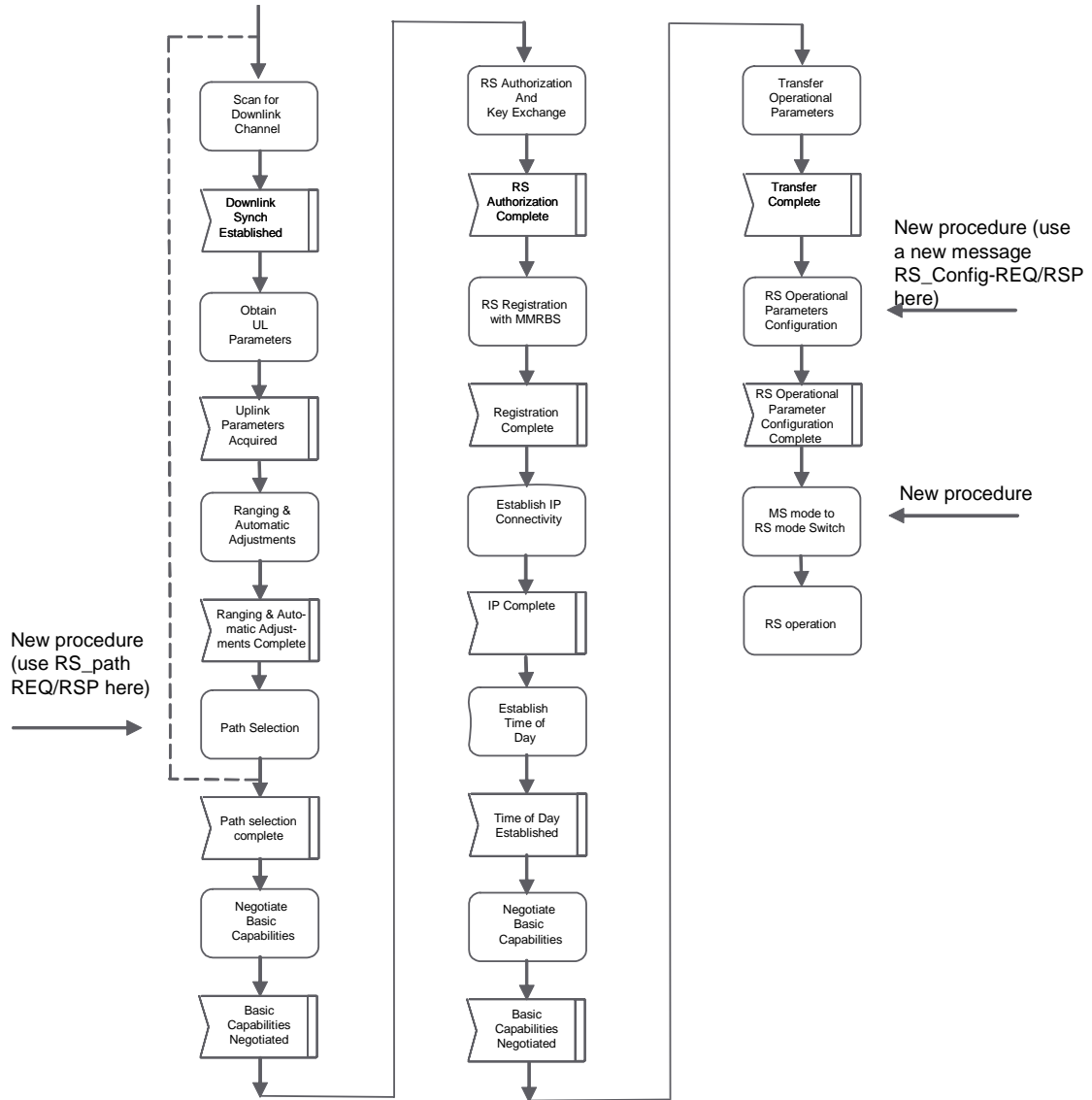
Figure 1. Proposed RS network entry.

## 3   Proposed text change

We propose the following modifications to 802.16e standard

### 3.1  RS initial network entry description

++++++++++++++ Start Text ++++++++++++++++++++++++++
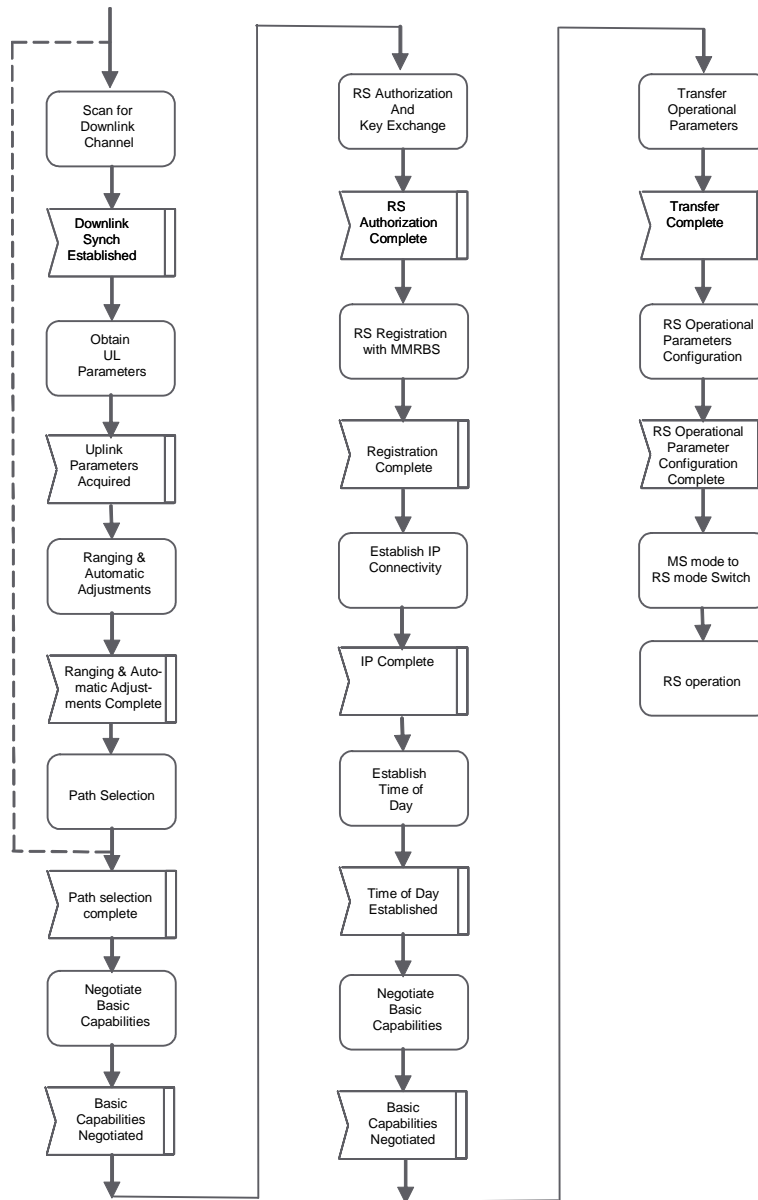
3

*[Add the following section]*

## 6.3.9.16 Network entry and initialization

## 6.3.9.16.1 RS network entry and initialization

RS network entry procedure is shown in Figure xxx.



From this figure, three new procedures are added to RS network entry procedure. They are path selection negotiation, relay station operational parameters configuration and MS to RS mode switch.

### 6.3.9.16.1.1. Path selection negotiation

This procedure enables a RS and the MMR-BS to negotiate the path selection of this RS. This operation happens after UL parameter automatic adjustment completion and before basic capability negotiation. During this operation a relay station shall report to the MMR-BS the radio environment measurements. The MMR-BS shall make final decision regarding the path selection (e.g., serving station selection).  RS-path-REQ/RSP message shall be used for this operation. A RS uses RS_path-REQ message to report its radio environment measurements to its associated MMR-BS. The MMR-BS shall determine the path of this RS based on the reported radio measurements and other information such as path loading and indicates the path selection for this RS using RS_path-RSP message.

### 6.3.9.16.1.2. Relay station operational parameter configuration

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 MMR-BS shall use RS configuration request /response message (RS_Config-REQ/RSP) to negotiate the configuration. A RS shall send RS_Config-REQ message to report its radio measurement or suggests parameter configuration(s) to its associated MMR-BS. The MMR-BS shall determine the parameter configurations and indicate to the RS using RS_Config-RSP message. The message exchange may happen more than one time. 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
- Switch action time.

### 6.3.9.16.1.3. MS mode to RS Mode Switch
At action time of MS mode to RS mode switching  a RS shall start the RS normal operation.


## 3.2  Introduction of RS configuration message (RS_Config-REQ/RSP)

*[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 | |

*[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

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This message may be transmitted by a RS to request some physical layer operation parameters. A RS may use this message to report information to facilitate the determination of a MMR-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 | |
|   Configured_para_type | 8 bits | b0 = 1: preamble configuration is included; b1 – b7: reserved |
|     If (b0 of Configured_para_type == 1 ) { | 8 bits | |
|       Preamble_index } | 7 bits | Preamble index |
|     TLV | Variable | |
| } | | |

**Configuration_para_type**
The first bit is used as preamble index indicator to indicate the preamble_index field appearance in this message
**Preamble_index**
This field is used to indicate the preamble index

## 6.3.2.3.63 MMR-BS configuration response message

This message shall be transmitted by a MMRBS for the purpose of RS configuration. A MMR-BS shall use this message to set operation parameters for a RS. MMR-BS can transmit this message as a response to RS_Config-REQ or as a unsolicited message.

| Syntax | Size | Notes |
|---|---|---|
| RS_Config-RSP format { | | |
|   Management message type = 68 | 8 bits | |
|   Configured_para_type | 8 bits | b0 = 1: preamble configuration is included; b1 – b7: reserved |
|     If (b0 of Configured_para_type == 1 ) { | 8 bits | |
|       Preamble_index } | 7 bits | Preamble index |
|     TLV | | |
| } | | |

**Configuration_para_type**
The first bit is used as preamble index indicator to indicate the preamble_index field appearance in this message
**Preamble_index**
This field is used to indicate the preamble index assigned by MMR-BS

## *3.3  Introduction of RS path selection message (RS_path-REQ/RSP)*

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

| Type | Message name | Message description | Connection |
|------|-------------|--------------------|-----------|
| ~~62-255~~ 67 | RS_path-REQ | RS path selection request message sent by RS | Basic |
| 68 | RS_path-RSP | RS path selection response message sent by MMRBS | Basic |
| 69-255 | | Reserved | |

*[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 path selection request message**

This message may be transmitted by a RS to report its radio environment measurement.

### Table XXX. RS_path-REQ message format.

| Syntax | Size | Notes |
|--------|------|-------|
| RS_path request format { | | |
|   Management message type = 67 | 8 bits | |
|   Number of reports | 2 bits | |
|   For (i=0;i< Number of reports; i++) { | | |
|     BSID | 24 bits | LSB 24 bits of BSID present in DL-MAP |
|     CINR mean | 8 bits | |
|   } | | |
| } | | |

**Number of reports**
> This field indicates the number of measurement reports in this message

**BSID**
> This field indicates identity of the station to which a RS shall access. The BSID includes the 24 LSB of BSID present in DL-MAP of this station.

**CINR mean**
> The CINR mean parameter indicates the CINR in dB measured at the RS on the downlink signal of a particular station with BSID in BSID field. The value shall be interpreted as a signed byte with the resolution of 0.5dB. The measurement shall be performed on subcarriers of the frame preamble that are active in the particular station's segment and averaged over the measurement period.

**6.3.2.3.63 RS path selection response message**

This message shall be transmitted by a MMR-BS to a RS as a response to the RS_path request message. MMR-BS use this message to indicate the serving station the RS shall access to.

Table XXX. RS_path-RSP message format.

| Syntax | Size | Notes |
|---|---|---|
| RS_path response format { | | |
| Management message type = 67 | 8 bits | |
| BSID | 24 bits | LSB 24 bits of BSID present in DL-MAP |
| RSID | 8 bits | RSID assigned to the requesting RS by the MMR-BS. |
| } | | |

**BSID**
This field indicates identity of the station to which a RS shall access. The BSID includes the 24 LSB of BSID present in DL-MAP of this station.

**RSID**
This field indicates the assigned RSID to the requesting RS.

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