Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	MS Initial Ranging with Transparent RS	
Date Submitted	2006-01-16	
Source(s)	Kanchei (Ken) Loa, Yung-Ting Lee, Yi-Hsueh Tsai, Heng-Iang Hsu, Chih-Chiang Hsieh, Shiann-Tsong Sheu, Frank C.D. Tsai, Youn-Tai Lee, Hua-Chiang Yin, Institute for Information Industry 8F., No. 218, Sec. 2, Dunhua S. Rd., Taipei City, Taiwan.	Voice: +886-2-2739-9616 loa@iii.org.tw
	Hang Zhang, Peiying Zhu, Mo-Han Fong, Wen Tong, David Steer, Gamini Senarath, Derek Yu, Mark Naden, G.Q. Wang Nortel 3500 Carling Avenue Ottawa, Ontario K2H 8E9	Voice: +1 613 7631315 WenTong@nortel.com pyzhu@nortel.com
	Yu Ge, Peng-Yong Kong, Chen-Khong Tham 21 Heng Mui Keng Terrace Singapore 119613	Voice: +65-6874.1950 Fax: +65-6775.5014 geyu@i2r.a-star.edu.sg
	[add co-authors here]	
Re:	IEEE 802.16j-06/034: “Call for Technical Proposals regarding IEEE Project P802.16j”	
Abstract	This contribution proposes procedures for MS initial ranging with transparent RS	
Purpose	Text proposal for 802.16j Baseline Document	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	

Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or 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>.

MS Initial Ranging with Transparent RS

Introduction

This contribution describes MS initial ranging with transparent RS under centralized scheduling scheme. In order to facilitate the incorporation of this proposal into IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026r1 are listed below.

Text Proposal

6.3.9.16 Support for network entry and initialization in relay mode

6.3.9.16.1 MS network entry procedures in transparent RS systems

In MS network entry procedure in transparent RS systems, MS scans for downlink channel and establishes synchronization with the MR-BS, then obtains transmission parameters from UCD message as described in 6.3.9.1 through 6.3.9.4.

The initial ranging process shall begin by sending initial-ranging CDMA codes on the UL allocation dedicated for that purpose (for more details see 6.3.10.3).

6.3.10.3.4 Relaying support for OFDMA based ranging

6.3.10.3.4.1 MS initial ranging and automatic adjustments with transparent RS

The code may be received by the MR-BS and RSs near the MS. RSs receiving the code shall transmit a RLY_RC-REP message to the serving MR-BS through the relay path. The RLY_RC-REP message is defined in xxx. When RS receives multiple codes in the ranging subchannel of a frame, the RLY_RC-REP message sent by the RS to serving MR-BS may contain information of multiple received codes.

When the MR-BS receives ranging code, it shall wait for RLY_RC-REP message from its subordinate RSs for T48 timer. Once T48 timer expired, the MR-BS could compare the measured signal information at each access station or utilize policies to decide a designated access station to communicate with the code originating MS. Algorithms and policies to select access station(s) and associated relay path are out of scope of this specification.

After selecting the RS, the MR-BS shall transmit an RNG-RSP message with initial ranging CID to the MS. If the ranging status is success, the MR-BS should transmit an RLY_RC-ACP message to the designated access RS in order to notify the RS to receive and relay RNG-REQ message transmitted on a burst specified with CDMA_Allocation-IE in UL-MAP. The RLY_RC-ACP message is defined in xxx. If direct communication to MS is selected by the MR-BS, the MR-BS follows sequence described in 6.3.10.3.

Upon receiving an RNG-REQ message with the initial ranging CID from MS, the RS shall send an RLY_CA-REP message containing the RNG-REQ message to the serving MR-BS. The RLY_CA-REP is defined in xxx.

Once the MR-BS receives the RLY_CA-REP containing RNG-REQ message with initial ranging CID, the MR-BS shall assign Basic and Primary management CIDs to the correspondent MS, and may transmit an RLY_IR-CMP message to the RS to notify the RS to receive and relay the data transmitted by the MS. The RLY_IR-CMP message is defined in xxx. Afterward, the MR-BS shall send RNG-RSP message with the initial ranging CID to the MS, which may contain the adjustment information.

After assigning the basic and primary management CID to an MS, the MS and MR-BS shall continue network entry process as described in the 6.3.9.7 through 6.3.9.13 using the MS's management CIDs.

Table xxx – RLY_RC-REP message encodings

	Type (1 byte)	Length	Value (Variable-length)	PHY Scope
Timing Adjust	TBA	4	Tx timing offset adjustment (signed 32-bit). The amount of time required to adjust MS transmission so the bursts will arrive at the expected time instance at the RS. Units are PHY specific (see 10.3). The SS shall advance its burst transmission time if the value is negative and delay its burst transmission if the value is positive.	OFDMA
Power Level Adjust	TBA	1	Tx Power offset adjustment (signed 8-bit, 0.25 dB units). Specifies the relative change in transmission power level that the MS is to make in order that transmissions arrive at the RS at the desired power. When subchannelization is employed, the subscriber shall interpret the power offset adjustment as a required change to the transmitted power density.	OFDMA
Offset Frequency Adjust	TBA	4	Tx frequency offset adjustment (signed 32-bit, Hz units). Specifies the relative change in transmission frequency that the MS is to make in order to better match the RS. (This is fine-frequency adjustment within a channel, not reassignment to a different channel.). The MS shall increase its transmit frequency if the value is positive and decrease its transmit frequency if the value is negative.	OFDMA
Ranging Status	TBA	1	Used to indicate whether uplink messages are received within acceptable limits by RS. 1 = continue, 2 = abort, 3 = success	OFDMA
Received Ranging Code Attributes	TBA	4	Bits 31:22 – Used to indicate the OFDM time symbol reference that was used to transmit the ranging code. Bits 21:16 – Used to indicate the OFDMA subchannel	OFDMA

			reference that was used to transmit the ranging code. Bits 15:8 – Used to indicate the ranging code index that was sent by the MS. Bits 7:0 – The 8 least significant bits of the frame number of the OFDMA frame where the MS sent the ranging code.	
MS CINR mean	TBA	1	The MS CINR mean parameter indicates the CINR measured by the RS from the MS. The value shall be interpreted as a signed byte with units of (TBD) dB. The measurement shall be performed on the CDMA ranging signal sent by the MS and averaged over the measurement period.	OFDMA
MS RSSI mean	TBA	1	The MS RSSI mean parameter indicates the Received Signal Strength measured by the RS from the MS. The value shall be interpreted as an unsigned byte with units of (TBD) dB, such that 0x00 is interpreted as (TBD) dBm, an RS shall be able to report values in the range (TBD) dBm to (TBD) dBm. The measurement shall be performed on the CDMA ranging signal sent by the MS and averaged over the measurement period	OFDMA

Table xxx – RLY_RC-ACP message format

Syntax	Size	Notes
RLY_RC-ACP_Message_Format(){		
Management Message Type = xx	8 bits	
TLV Encoded Information	variable	TLV specific
}		

Table xxx – RLY_RC-ACP message encodings

	Type (1 byte)	Length	Value (Variable-length)	PHY Scope
CDMA Allocation Info	TBA	Variable	CDMA Allocation Info indicates the RS to receive the PDU (i.e. RNG-REQ message) on a specified burst.	OFDMA

Table xxx – RLY_CA-REP message format

Syntax	Size	Notes
RLY_CA-REP_Message_Format(){		
Management Message Type = xx	8 bits	
TLV Encoded Information	variable	TLV specific
}		

Table xxx –RLY_CA-REP message encodings

	Type (1 byte)	Length	Value (Variable-length)	PHY Scope
Timing Adjust	TBA	4	Tx timing offset adjustment (signed 32-bit). The amount of time required to adjust MS transmission so the bursts will arrive at the expected time instance at the RS. Units are PHY specific (see 10.3). The MS shall advance its burst transmission time if the value is negative and delay its burst transmission if the value is positive.	OFDMA
Power Level Adjust	TBA	1	Tx Power offset adjustment (signed 8-bit, 0.25 dB units) Specifies the relative change in transmission power level that the MS is to make in order that transmissions arrive at the RS at the desired power. When subchannelization is employed, the subscriber shall interpret the power offset adjustment as a required change to the transmitted power density.	OFDMA
Offset Frequency Adjust	TBA	4	Tx frequency offset adjustment (signed 32-bit, Hz units) Specifies the relative change in transmission frequency that the MS is to make in order to better match the RS. (This is fine-frequency adjustment within a channel, not reassignment to a different channel.). The MS shall increase its transmit frequency if the value is positive and decrease its transmit frequency if the value is negative.	OFDMA
Ranging Status	TBA	1	Used to indicate whether uplink messages are received within acceptable limits by RS. 1 = continue, 2 = abort, 3 = success	OFDMA

Attached MS messages	TBA	variable	RNG-REQ or Bandwidth Request messages from MS received in the region described in CDMA allocation IE	OFDMA
Access RS ID	TBA	6	Access RS MAC address	OFDMA

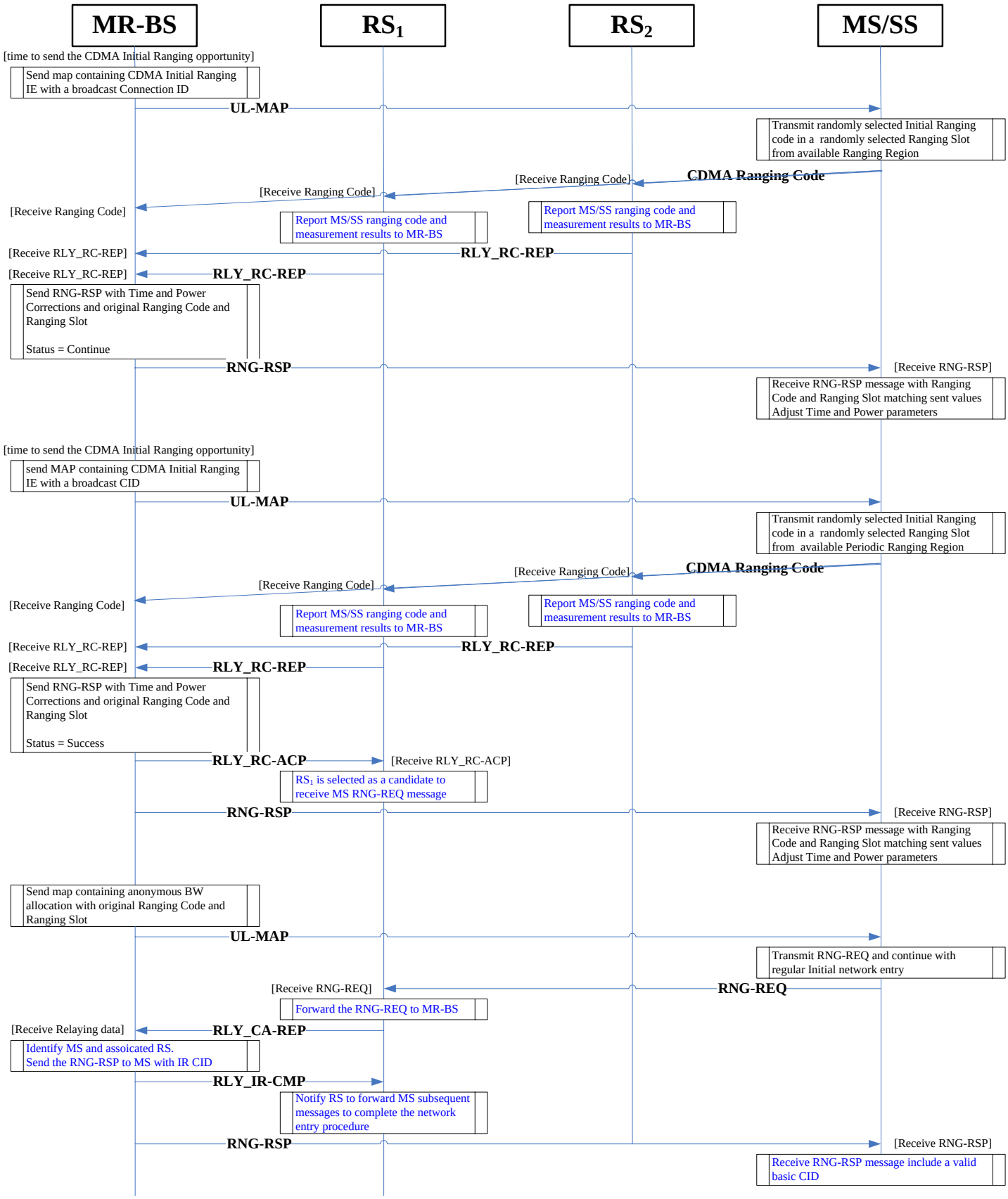
Table xxx – RLY_IR-CMP message format

Syntax	Size	Notes
RLY_IR-CMP_Message_Format(){		
Management Message Type = xx	8 bits	
TLV Encoded Information	variable	TLV specific
}		

Table xxx – RLY_IR-CMP message encodings

	Type (1 byte)	Length	Value (Variable-length)	PHY Scope
MS Info	TBA	Variable	MS Info is a compound TLV value that includes the MS's management CIDs. The details will be defined later.	OFDMA

Table xxx: Ranging and automatic adjustment procedure in transparent RS systems



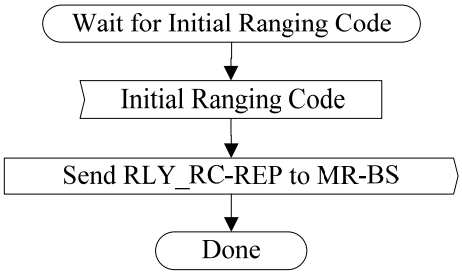


Figure xxx MS CDMA initial Ranging – Transparent Access RS (part 1)

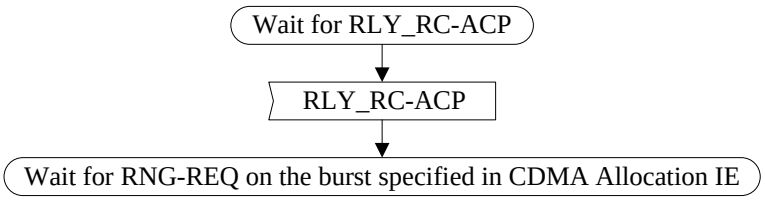


Figure xxx MS CDMA initial Ranging – Transparent Access RS (part 2)

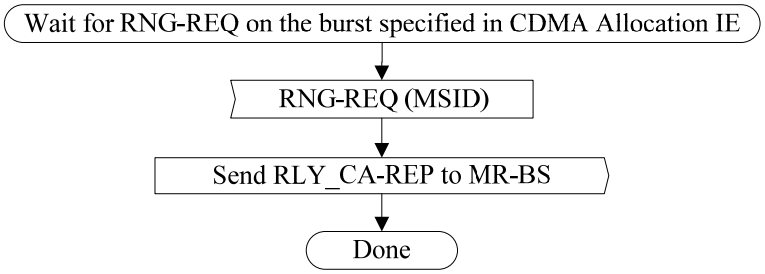


Figure yyy MS initial Ranging – Transparent Access RS (part 1)

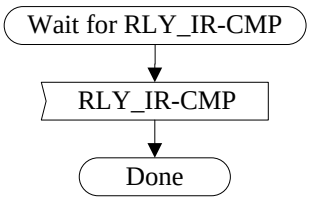


Figure yyy MS initial Ranging – Transparent Access RS (part 2)

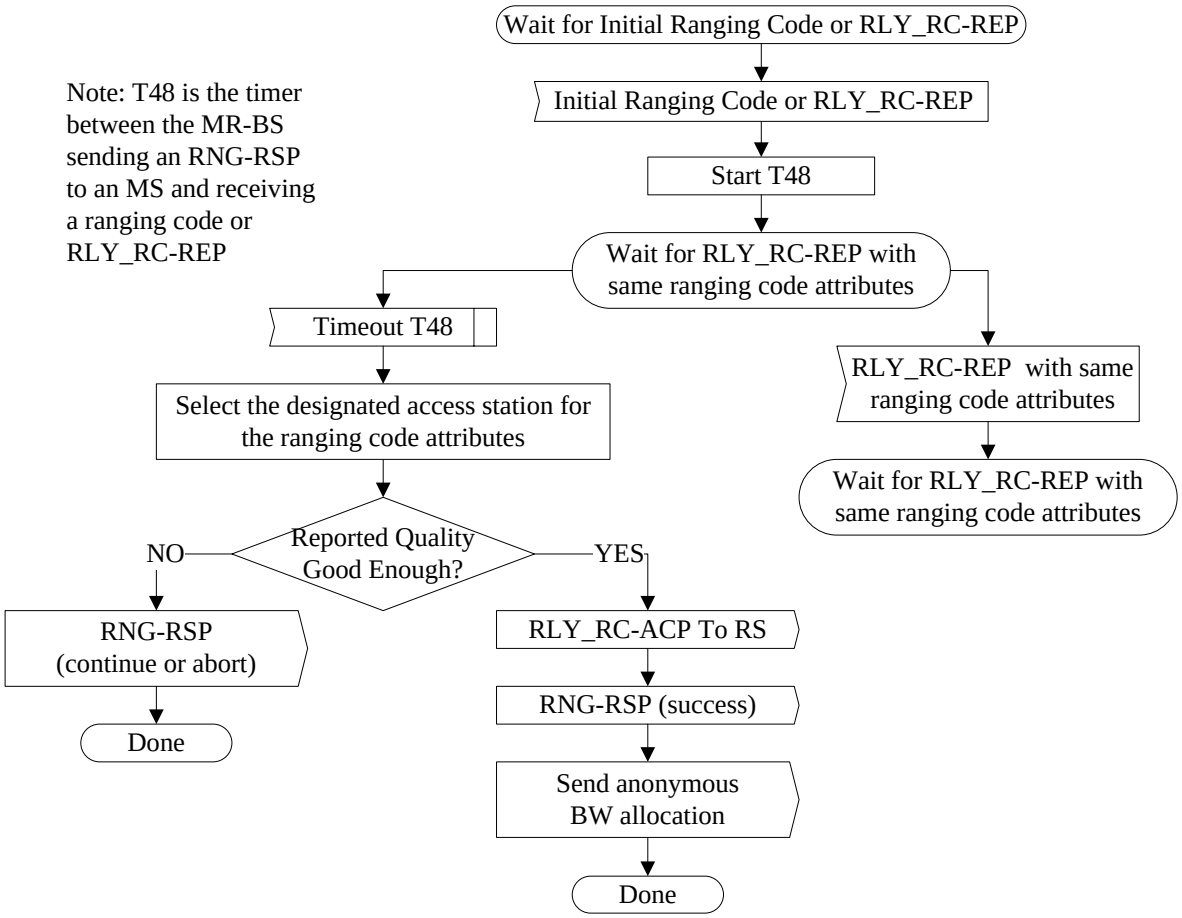
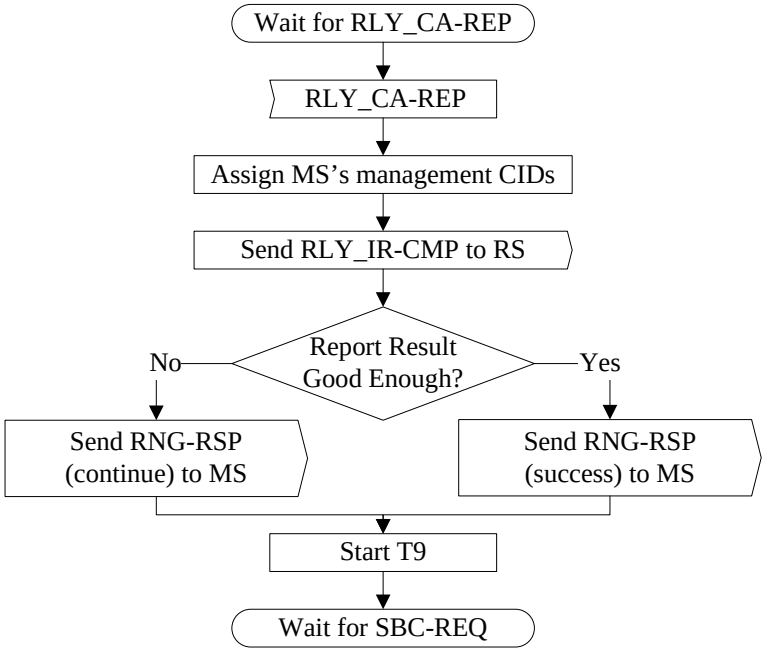


Figure zzz MS CDMA Initial Ranging with Transparent RS– MR-BS



Note: T9 is the timer between the MR-BS sending an RNG-RSP to an MS and receiving an SBC-REQ from the same MS

Figure zzz MS Initial Ranging with Transparent RS– MR-BS