Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Proposal for BS Related NRM Definitions**
Date Submitted	**Ballot Comments for 802.16g/D1 Letter Ballot #20**
Source(s)	**2006-03-03**
Re:	Scott Migaldi 1303 East Algonquin Road Schaumburg, IL. 60196
Abstract	Letter Ballot#20
Purpose	To facilitate comments in the LB#20 commentary database
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Comment number 1

Name	Default	Range	Description
SCOPE: per Sector			

wmanIfBsOfdmaDownlink-CenterFreq		IF (RF_BAND=2) THEN
		N*125, where
		;N 19 974…21 506,,[ ]∈
		IF (RF_BAND=3) THEN
		N*125, where
		N 27 294…28 786,,[ ]∈
			Center Downlink Frequency,
			in kHz.

wmanIfBsOfdmaPermuta-tionBase		0..127 step size = 1	Determines UL_PermBase parameter. Note: Prior to Corrigendum1/ D5, this param was known as UL_IDcell.
wmanIfBsOfdmaIDCell		0...31 step size = 1	IDcell parameter used in the DL Preamble
		0...31 step size = 1	IDcell parameter used in the DL Preamble
wmanIfBsOfdmaPermBase		0...31 step size = 1	DL_PermBase parameter used for Downlink zone switches, etc.

Comment number 2

Name	Default	Range	Description	
Parameters for MAC-construction (section 8.3) -Category = **configuration;** scope = per sector, per connection				
wmanIfBsCapCfgMac-CrcSupport (factory, per sector)		Enable/Disable	Indicates if BS is configured to support MAC level CRC	
wmanIfBsCapCfgMac-CrcSupport (configuration, per con-nection)		Enable/Disable	Indicates if connection is configured to support MAC level CRC. It is recommended that transport connections with HARQ have MAC level CRC disabled. Bit #0: Ability to receive requests piggybacked with data Bit #1: Ability to use 3-bit FSN values when forming MAC PDUs on non-ARQ connections	
wmanIfBsCapCfgPdu-Construction (factory, per sector)		0b00 - 0b11	Specifies configured capabilities for construction and transmission of MAC PDUs. Bit #0: Ability to receive requests piggybacked with data Bit #1: Ability to use 3-bit FSN values when forming MAC PDUs on non-ARQ connections. If disabled, 11 bit FSN supported instead.	
Parameters for MAC-ARQ - Category = **Configuration;**scope = per service class				
wmanIfBsQosScArqEn-able (per connection)		Enable/Disable	ARQ can be disabled or enabled per service class (connection).	
wmanIfBsCapCfgArq-Support (factory, per sector)		Enable/Disable	Indicates whether the BS is configured to support ARQ	
wmanIfBsQosScArqDe-liverInOrder		True/False	Option to deliver SDUs in order from MAC. HARQ can result in PDUs and SDUs being delivered to the receiver out of order.	
wmanIfBsQosScAr-qBlockSize		16, 32, 64, 128, 256, 512, 1024 bytes units= bytes	Maximum Size of an ARQ block that the BS will support on either UL or DL connections. **IM rule:**To minimize memory requirements in the BS, wmanIfBsQosScArqBlockSize times wmanIfBsQosScArqWindowSize should always be less than or equal to 51.2 kBytes	

Name	Default	Range	Description	
wmanIfBsQosScArqWindowSize		1-1024 step size = 1 units = ARQ blocks	Maximum number of unacknowledged ARQ blocks at any given time. **IM rule:**To minimize memory requirements in the BS, wmanIfBsQosScArqBlockSize times wmanIfBsQosScArqWindowSize should always be less than or equal to 51.2 kBytes	
wmanIfBsQosScArqBlockLifetime		0 = Infinite 1-655350 step size = 10 units =μs	Maximum time interval an ARQ block is managed by the transmitter ARQ state machine, before the block is discarded.	
wmanIfBsArqRetryTimeoutTransmitterDelay		1-655350 step size = 10 units =μs	Total transmitter delay of the BS, including scheduling and propagation delay. Negotiated at the time of DSA/REG.	
wmanIfBsArqRetryTimeoutReceiverDelay		1-655350 step size = 10 units =μs	Total receiver delay of the BS, including scheduling and propagation delay. Negotiated at the time of DSA/REG.	
wmanIfBsQosScArqSyncLossTimeout		0 = Infinite 1-655350 step size = 10 units =μs	The maximum time interval ARQ_TX_WINDOW_START or ARQ_RX_WINDOW_START shall be allowed to remain at the same value before declaring a loss of synchronization of the sender and receiver state machines when data transfer is known to be active. Set by BS in DSA/REG.	
wmanIfBsQosScArqRxPurgeTimeout		0 = Infinite 1-655350 step size = 10 units =μs	Time interval the receiver shall wait after successful reception of a block that does not result in advancement of ARQ_RX_WINDOW _START, before advancing ARQ_RX _WINDOW_START. Negotiated at the time of DSA/REG.	
Parameters for HARQ - Category = factory; scope = per sector				
wmanIfBsOfdmaHARQAackDelayULBurst		1-3 frames step size =1	Number of frames that the MSS waits before transmitting ACK or NACK. All MSSs will use the same offset to allow coordination of timing in ACK channels.	
wmanIfBsOfdmaHARQAackDelayBurst		1-3 frames step size =1	Number of frames that the BS waits before transmitting ACK or NACK. The same value is used for all MSSs to allow coordination of timing in ACK channels.	

wmanIfBsOfdmaHARQDlMaxRetrans		0 to 4 step size =1	Maximum number of DL HARQ retransmissions of the same packet.	
wmanIfBsOfdmaHARQUlMaxRetrans		0 to 4 step size =1	Maximum number of UL HARQ retransmissions of the same packet.	

Name	Default	Range	Description	
wmanIfBsOfdmaSizeCqichIdField		**0 = 0 bits** 1 = 3 bits 2 = 4 bits 3 = 5 bits 4 = 6 bits 5 = 7 bits 6 = 8 bits 7 = 9 bits 8...255 = Reserved	Defines the size of CQICH ID field used in the CQICH Allocation IE and DCD.	
wmanIfBsOfdmaMaxHARQDlSubBursts		0-16384 bytes	Maximum size of DL HARQ sub-burst.	
wmanIfBsOfdmaMaxHARQUlSubBursts		0-16384 bytes	Maximum size of UL HARQ sub-burst.	
Parameters for Ranging -Category: Advanced Configuration; scope: per sector				
wmanIfBsRangingRegionChannels		1-4 channels step size =1	Number of Ranging channels that determine the rectangular ranging region. Each Ranging channel requires 6 subchannels.	
wmanIfBsRangingRegionSymbols		3-12 channels step size =1	Number of Ranging symbols that determine the rectangular ranging region.	
wmanIfBsInitialRangingInterval		1-100 frames step size =1	Number of frames between Ranging region allocations.	
wmanIfBsBwRequestRangingInterval		1-100 frames step size =1	Number of frames between BW Request Ranging region allocations.	
wmanIfBsOfdmaStartOfRngCodes		0-255 step size =1	Indicates the starting number, S, of the group of CDMA codes used for this uplink. If not specified, the default value shall be set to zero. All the ranging codes used on this uplink will be between S and ((S+N+M+L+O) mod 256). Where, N is the number of initial-ranging codes M is the number of periodic-ranging codes	

			L is the number of bandwidth-request codes O is the number of handover-ranging codes In some cases, it may be desireable to use a mutually exclusive set of CDMA codes in each sector of a BTS. **IM rule:** (255 - wmanIfBsOfdmaStartOfRngCodes) >= (IwmanIfBsOfdmaInitRngCodes +wmanIfBsOfdmaPeriodicRngCodes +wmanIfBsHandoverRangingCodes +wmanIfBsOfdmaBWReqCodes)	
Name	**Default**	**Range**	**Description**	
IwmanIfBsOfdmaInitRngCodes		0-32 step size =1	Number of Initial Ranging CDMA Codes.	
wmanIfBsOfdmaPeriodicRngCodes		0-32 step size =1	Number of Periodic Ranging CDMA Codes.	
wmanIfBsHandoverRangingCodes		0-32 step size =1	Number of Handover Ranging CDMA Codes.	
wmanIfBsOfdmaBWReqCodes		0-32 step size =1	Number of BW Request Ranging CDMA Codes.	
Parameters for Ranging -Category: Factory; scope: per sector				
wmanIfBsInitialRangingBackoffStart		0-15 step size =1	Initial backoff window size for initial ranging contention, expressed as a power of 2. The highest order bits shall be unused and set to 0.	
wmanIfBsInitialRangingBackoffEnd		0-15 step size =1	Final backoff window size for initial ranging contention, expressed as a power of 2.The highest order bits shall be unused and set to 0. **IM rule:** (wmanIfBsInitialRangingBackoffEnd >= wmanIfBsInitialRangingBackoffStart)	
wmanIfBsOfdmaPerRngBackoffStart		0-15 step size =1	Initial backoff window size for periodic ranging contention, expressed as a power of 2. The highest order bits shall be unused and set to 0.	
wmanIfBsOfdmaPerRngBackoffEnd		0-15 step size =1	Final backoff window size for periodic ranging contention, expressed as a power of 2. The highest order bits shall be unused and set to 0. **IM rule:** (wmanIfBsOfdmaPerRngBackoffEnd >= wmanIfBsOfdmaPerRngBackoffStart)	
wmanIfBsHoRangingBackoffStart		0-15 step size =1	Initial backoff window size for handover ranging contention, expressed as a power of 2. The highest order bits shall be unused and set to 0.	
wmanIfBsHoRangingBackoffEnd		0-15 step size =1	Final backoff window size for handover ranging contention, expressed as a power of 2. The highest order bits shall be unused and set to 0.	

			IM rule: (wmanIfBsHoRangingBackoffEnd >= wmanIfBsHoRangingBackoffStart)	
Name	**Default**	**Range**	**Description**	
wmanIfBsBWReqRanging BackoffStart		0-15 step size =1	Initial backoff window size for ranging BW Request contention, expressed as a power of 2.The highest order bits shall be unused and set to 0.	
wmanIfBsBWReqRangingBackoffEnd		0-15 step size =1	Final backoff window size for ranging BW Request contention, expressed as a power of 2. The highest order bits shall be unused and set to 0. **IM rule:** wmanIfBsBWReqRangingBackoffEnd >= wmanIfBsBWReqRangingBackoffStart	
wmanIfBsRangingFreq OffsetLimit		0-255 Hz step size =1	BS performs Initial Ranging until the MSS transmissions are within the specified frequency offset limit.	
wmanIfBsRangingTimingOffsetLimit		0-255 1/Fs step size =1	BS performs Initial Ranging until the MSS transmissions are within the specified timing offset limit.	
wmanIfBsContentionBasedReservationTimeout		0 to 100 units = frames	Number of UL-MAPs to receive before contention-based reservation is attempted again for the same connection.-	
wmanIfBsSsRangRespProcTime		10 to 20 units = ms	Time allowed for an SS following receipt of a ranging response before it is expected to reply to an invited ranging request.	
wmanIfCmnInvitedRangRetries		16-24	Number of retries on inviting Ranging Requests	
Parameters for Channel Descriptors - Category = Advanced Configuration; scope = per sector				
wmanIfBsDcdInterval		0-10,000ms step size =1	Time between transmission of DCD messages in ms.	
wmanIfBsUcdInterval (derived parameter)		0-10,000ms step size =1	Time between transmission of UCD messages in ms. wmanIfBsUcdInterval equals wmanIfBsDcdInterval	
wmanIfBsUcdTransition (derived parameter)		1-10 frames step size =1	The time the BS shall wait after transmitting a UCD message with an incremented Configuration Change Count before issuing a UL-MAP message referring to TLVs defined in that UCD message. wmanIfBsUcdTransition equals wmanIfBsDcdTransition	
wmanIfBsDcdTransition		1-10 frames step size =1	The time the BS shall wait after transmitting a DCD message with an incremented Configuration Change Count before issuing a DL-MAP message referring to TLVs defined in that DCD message.	

Name	Default	Range	Description	
Parameters for Fast-Feedback Channels -Category = Configuration; scope= per sector				
wmanIfBsCQICHMaxLength		1-64 slots step size =1	Maximum number of fast-feedback channel in a single frame. The maximum number of MSS allowed to provide fast-feedback is wmanIfBsCQICHMaxLength times wmanIfBsCQICHMaxPeriod. **IM rule**: **when FFT_SIZE = 512 and wmanIfBsUplinkPermutationType = 1 (UL PUSC1/3), then wmanIfBsCQICHMaxLength must be less than or equal to 5.**	
wmanIfBsCQICHMaxPeriod		1-8 step size =1	Exponent indicating the number of frames between fast-feedback channel assignments to an individual MSS. Actual period = 2^ wmanIfBsCQICHMaxPeriod	
wmanIfBsCQICHDuration		0-7 step size =1 0 means stop periodic feedback 7 means continuous feedback.	Duration exponent of fast-feedback channel assignment. Actual duration = 10* 2^ wmanIfBsCQICHDuration	
CINR_MEASUREMENT_TYPE		1 = Physical CINR measurement from the preamble for frequency reuse==1 2 =Physical CINR measurement from the preamble for frequency reuse==3	Type of CINR measurement to report. Defined in the CQICH Allocation IE. Frequency Reuse factor == 1 uses all preamble subcarriers (except guard and DC) to calculate CINR. The unmodulated subcarriers should be considered noise and interference for the CINR estimate. Use with 1x3x1(PUSC1/1) reuse. Frequency Reuse factor == 3. The unmodulated subcarriers should be considered noise and interference for the CINR estimate. Use with 1x3x1 (PUSC1/3) or 1x3x3(PUSC1/1) reuse.	
Parameters for DL/UL Data Delivery - Category = Configuration; scope= per sector				
DL_Feedback_Allocation_Threshold		0 to 600 units = bytes	Threshold to allow the BS to make an immediate DL allocation to a MSS using the most robust modulation coding rate without the need to wait for MSS to provide DL CINR on fast-feedback channel.	

Name	Default	Range	Description	
wmanIfBsOfdmaUlTimeAllocationExponent		0 to 31 step size = 1 wmanIfBsOfdmaUlTimeAll o cationExponent should always be greater than wmanIfBsOfdmaTxPowerR e portInterval	Allow the BS to make an immediate UL allocation to a MSS using a modulation coding rate based on MSS transmit power information if received within the specified time threshold. The threshold is equal to 2^wmanIfBsOfdmaUlTimeAllocationE xp onent.	
wmanIfBsOfdmaUlFeedbackAllocationThreshold (Nasme change!)		0 to 600 **units = bytes**	Threshold to allow the BS to make an immediate UL allocation to a MSS using the most robust modulation coding rate without the need to wait for MSS Transmit power information.	
wmanIfBsOfdmaTxPower ReportInterval		0-15 frames 15 means infinite (don't use) step size = 1	Time threshold exponent to determine when the MSS must report transmit power. Value used by MSS is 2^ wmanIfBsOfdmaTxPowerReportInterval. Only applies when the MSS is actively requesting and transmitting UL data.	
wmanIfBsOfdmaTxPower ReportThreshold		0-15 dB 15 means infinite (don't use)	Path loss threshold exponent to determine when the MSS must report transmit power. Only applies when the MSS is actively requesting and transmitting UL data.	
wmanIfBsOfdmaTxPower ReportAlphaPAvg		0-15 multiples of 1/16 (1/16 to 16/16)		
Parameters for Sleep Mode - Category = factory; scope= per sector				
wmanIfBsMaxInitSleep Window		2 - 256 unit = frames	The maximum initial sleeping window allowed for the MSS.	
wmanIfBsMaxFinalSleepBase		1 - 1024 unit = frames	The maximum final sleeping window base allowed for the MSS.	
wmanIfBsMaxFinalSleepExponent		0 -7 unit = frames	The maximum final sleeping window exponent allowed for the MSS.	
wmanIfBsMinSleepListenInterval		2 -64 unit = frames	The minimum number of frames that the MS must listen during sleep mode.	
wmanIfBsMinSleepListenInterval		2 - 64 unit = frames	The maximum number of frames that the MS must listen during sleep mode.	
Sector Parameters for Handover				
wmanIfBsScanTriggerType		0 = CINR 1 = RSSI 2 = RTD	Defines type of trigger metric to initiate scanning or reporting of neighbor cells. Scan Trigger action is triggered if function using specified metric with specified average	

			exceeds specified value. Note: multiple scan triggers can be configured in a sector	
wmanIfBsScanTriggerType		5: Metric of serving BS greater than absolute value 6: Metric of serving BS less than absolute value	Defines the type of function to initiate scanning or reporting of neighbor cells Scan Trigger action is triggered if function using specified metric with specified average exceeds specified value.	
wmanIfBsScanTriggerAction		1: Respond on trigger with MOB_SCN-REP after the end of each scanning interval 2: Respond on trigger with MOB_MSHO-REQ 3: On trigger, MSS starts neighbor BS scanning process by sending MOB_SCN-REQ	Defines the action that the MSS takes when the specified scan trigger condition is met. Scan Trigger action is triggered if function using specified metric with specified average exceeds specified value.	
wmanIfBsScanTriggerValue		0-255 step size: 1 unit: dB or -dBm, depends on action	Defines the value utilized in the scan trigger function. Scan Trigger action is triggered if function using specified metric with specified average exceeds specified value.	
wmanIfBsScanTriggerAverage		0-255 step size: 1 units: ms	Trigger averaging duration is the time in ms over which the metric measurements are averaged. When the mean value of the measurement meets the trigger condition, the MSS reacts using the MSS reacts using the specified action.	

Name	Default	Range	Description	
wmanIfBsHoCellTriggerType		0 = CINR 1 = RSSI	Defines type of trigger metric to initiate handover. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value. Note: multiple handover triggers can be configured in a sector.	
wmanIfBsHoCellTriggerFunction		1: Metric of neighbor BS is greater than absolute value 2: Metric of neighbor BS is less than absolute value 3: Metric of neighbor BS is greater than serving BS metric by relative value 4: Metric of neighbor BS is less than serving BS metric by relative value	Defines type of function to initiate handover. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value.	

wmanIfBsHoCellTriggeAction		1: Respond on trigger with MOB_SCN-REP after the end of each scanning interval 2: Respond on trigger with MOB_MSHO-REQ	Defines handover Trigger action. Action is initiated if trigger function using specified metric using specified average exceeds specified value.	
wmanIfBsHoCellTriggerValue		0-255 step size: 1 unit: dB or -dBm, depends on action	Defines the value discussed in handover trigger function. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value.	
wmanIfBsHoCellTriggerAverage		0-255 step size: 1 units: ms	Trigger averaging duration is the time in ms over which the metric measurements are averaged. When the mean value of the measurement meets the trigger condition, the MSS reacts using the specified action.	
Neighbor Parameters for Handover				
wmanIfBsHoNbrTriggerType		0 = CINR 1 = RSSI	Defines type of trigger metric to initiate handover. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value. Note: multiple handover triggers can be configured for an individual neighbor BS.	
wmanIfBsHoNbrTriggerFunction		1: Metric of neighbor BS is greater than absolute value 2: Metric of neighbor BS is less than absolute value 3: Metric of neighbor BS is greater than serving BS metric by relative value 4: Metric of neighbor BS is less than serving BS metric by relative value	Defines type of function to initiate handover. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value.	

Name	Default	Range	Description	
HwmanIfBsHoNbrActio n		1: Respond on trigger with MOB_SCN-REP after the end of each scanning interval 2: Respond on trigger with MOB_MSHO-REQ	Defines handover Trigger action. Action is initiated if trigger function using specified metric using specified average exceeds specified value.	
wmanIfBsHoNbrTriggerrvalue		0-255 step size: 1 unit: dB or -dBm, depends on action	Defines the value discussed in handover trigger function. Handover Trigger action is initiated if trigger function using specified metric using specified average exceeds specified value.	

wmanIfBsHoNbrTriggerAverage		0-255 step size: 1 units: ms	Trigger averaging duration is the time in ms over which the metric measurements are averaged. When the mean value of the measurement meets the trigger condition, the MSS reacts using the specified action.	
wmanIfBsNbrPreamble		0-113	Configured Preamble index of neighbor BS	
wmanIfBsNbrBsId		6 bytes	Base Station Identifier of neighbor ID	
wmanIfBsNbrBsIndex		0-30	The index of each neighbor BS instance.	
wmanIfBsNbrTLV (derived)		variable	List of TLVs that are different for the neighbor BS compared to the current BS. Includes DCD, UCD, Paging, etc.	
Parameters for Idle Mode Category = Configuration; scope= per Paging Group;				
wmanIfPagingGroupId		0 to 65535 step size 1	ID number of the paging group assigned to the BS.	
wmanIfPagingControllerId		6 bytes	Logical network identifier for the CAPC retaining MSS context information while MSS in Idle Mode.	
wmanPagingCycle		0 to 65535 step size 1 unit = frames	Number of frames between the beginning of MSS listening intervals. Determines the frame in which the paging message is transmitted to a specific paging group.	
wmanPagingOffset		0 to 255 step size 1	Specifies the frame within the cycle in which the listening interval begins and paging message is transmitted. Must be smaller than PAGING CYCLE value.	
Parameters for Idle Mode Category = Factory; scope= per BS;				
wmanIfBsReqDuration		0 - 64 step size = 1 units = frames	Waiting value for the DREG-REQ message re-transmission	

Name	Default	Range	Description	
wmanIfBsPagingIntervalLength		2-5 unit = frames	Duration of paging listening interval that the BS can page idle MSS on.	

BwmanIfBsIdleModeSystemTimer		128 to 65535 unit = seconds	Max time interval at BS to receive Idle Mode Location Update from MS. Paging Controller will discard MS context when this timer expires **IM rule: BwmanIfBsIdleModeSystemTimer should be greater than wmanIfBsIdleModeTimeout**	
wmanIfBsIdleModeTimeout		128 to 65535 unit = seconds	Max time interval at MS to send Idle Mode Location Update to BS.	
wmanIfBsMRHTimer		0 to 10,000 unit = milliseconds	Management Resource Holding (MRH) timer that defines how long the BS will retain MS connection information with the MS after the BS send DREG-CMD to the MS. **IM rule: wmanIfBsMRHTimer should be less than wmanIfBsIdleModeTimeout**	
wmanIfBsDregCommandRetryCount		3-16	Number of retries on DREG-CMD Message	
wmanIfBsT46		0 - 500	Time the BS waits for DREGREQ in case of unsolicited Idle Mode initiation from BS.	
wmanIfPagingRetryCount Scope: per BS and/or per CAPC		0 - 16	Total number of paging retries on paging transmission that the BS will send to a MSS.	
wmanIfBsInitIdleModeHighThreshold		1- 255	The number of active MSSs in a BS that forces the BS to start initiating idle mode with MSSs in the BS. **IM rule:** wmanIfBsInitIdleModeHighThreshold should be greater than wmanIfBsInitIdleModeLowThreshold	
wmanIfBsInitIdleModeLowThreshold		1 - 255	The number of active MSSs in a BS that forces the BS to stop initiating idle mode with MSSs in the BS.	
Parameters for BS Memory Estimations-Category: Factory; scope: per sector				
wmanIfBsMaxNumberTransportCids		512 (1UL/1 DL CID per MSS) to 4096 (8 UL/8 DL CIDs per MSS)	The maximum number of transport CIDS supported in the BS. This limit is needed for memory coordination in the BS.	
Max_Number_DL_MAC_ARQ_CIDs		0 to 4096	The maximum number of downlink transport CIDS that support MAC-level ARQ in the BS. This limit is needed for memory coordination in the BS.	
Max_Number_Classifiers_Per_CID		**0 to 32**	**The maximum number of Convergence Sublayer classifiers for a service flow.**	
MAX_Number_PHSrules_Per_Classifier		**0 to 32**	**The maximum number of Packet header Suppression rules for a service flow.**	

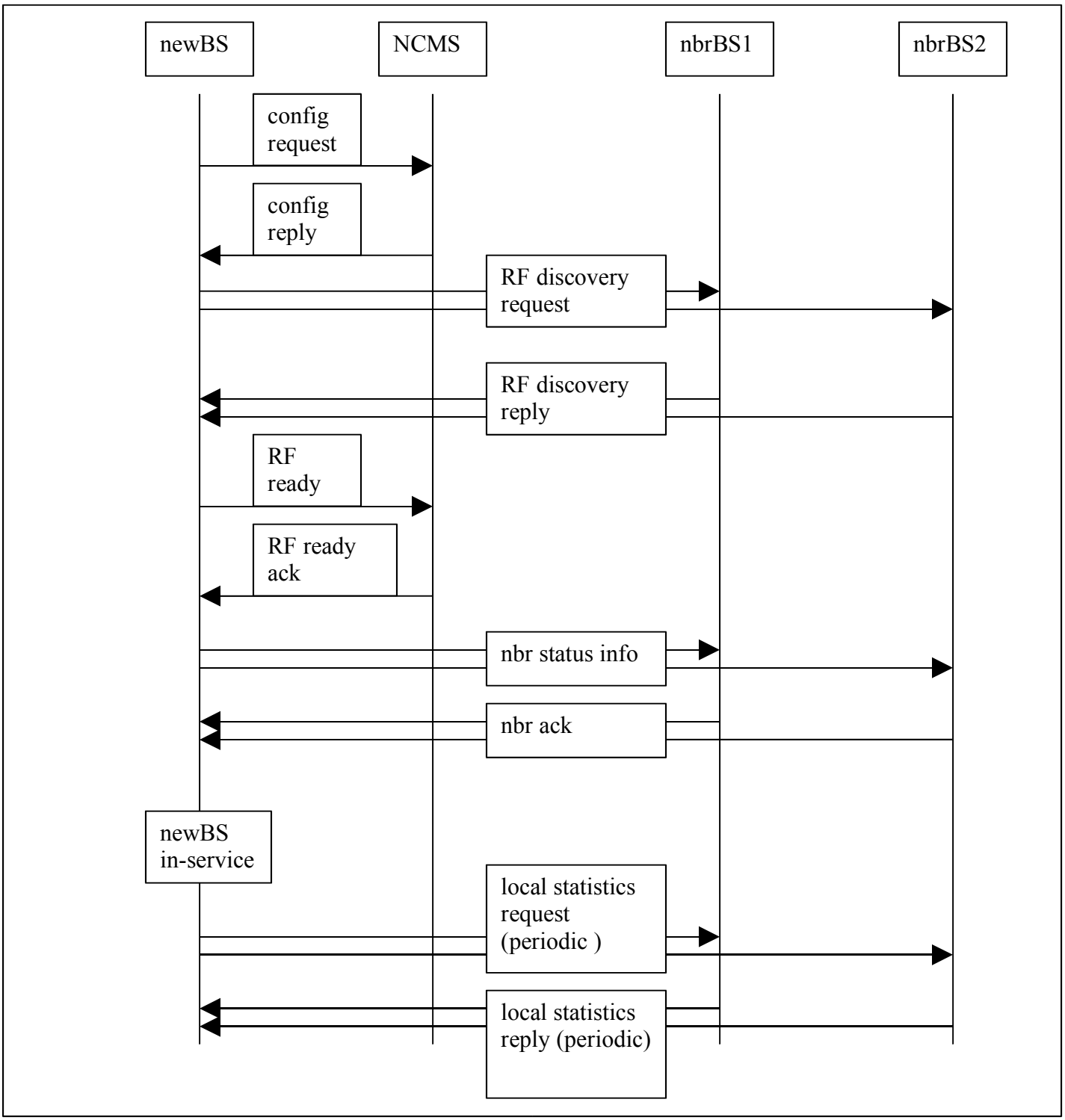
Name	Default	Range	Description	
Miscellaneous Parameters -Category: Factory; scope: per sector				

wmanIfBsT9Timeout		300 to 1000 units = ms	Registration Timeout, the time allowed between the BS sending a RNG-RSP (success) to an MSS, and receiving a SBC- REQ from that same MSS.	
wmanIfBsT17Timeout		5 to 100 units = minutes	Time allowed for MSS to complete MSS Authorization and Key Exchange	
wmanIfBsCapCfgTtgTransitionGap		0 to 50 units = µs	This field indicates the maximum allowed MSS transition speed SSTTG.	
wmanIfBsCapCfgRtgTransitionGap		0 to 50 units = µs	This field indicates the maximum allowed MSS transition speed SSRTG.	
wmanIfBsOfdmaBsId		6 bytes	Base Station Identifier	
wmanIfCmnDSxReqRetries		1-5	Number of Timeout Retries on DSA/DSC/DSD Requests	
wmanIfCmnDSxRespRetries		1-5	Number of Timeout Retries on DSA/DSC/DSD Responses	
wmanIfCmnT7Timeout		10 to 1000 units = ms	Wait for DSA/DSC/DSD Response Timeout	
wmanIfCmnT8Timeout		10 to 300 units = ms	Wait for DSA/DSC/DSD Acknowledge Timeout	
wmanIfCmnT10Timeout		10 to 3000 units = ms	Wait for Transaction End timeout	
wmanIfCmnT22Timeout		10 to 500 units = ms	Wait for ARQ Reset in ms	
wmanIfBsOfdmaMacVersion		5: Indicates conformance with IEEE Std. 802.16-2004 and IEEE P802.16-2004/ Cor1 and IEEE Std 802.16e- 2005	This parameter specifies the version of 802.16 to which the message originator conforms	
PMC_RSP_MaxResend		1-10	The maximum number of times the PMC_RSP is sent by the BS.	

Table XXX MAC Layer Standard Configuration Parameters

Comment # 3

14.2.2.7 BS Initiated Configuration Management



14.2.2.7.X.1 **Configuration request**

14.2.2.7.X.1.1 Function

After getting start-up configuration file, a BS issues this primitive to NCMS to obtain permission to go in-service. It exchanges security information with the NCMS server.

14.2.2.7.1.2 Semantics of the service primitive

Configuration.request
{
    hardware configuration (RF carriers, cards, capacity)
    location
    MAC/IP
}

14.2.2.7.1.3 When generated

This primitive is generated by a BS at (re)startup.

14.2.2.7.1.4 Effect of receipt

NCMS issues a Configuration.reply primitive.

14.2.2.7.2 **Configuration reply**

14.2.2.7.1.1 Function

This primitive is issued by NCMS to the requesting BS indicating additional configuration parameters for the BS to go in-service.

14.2.2.7.1.2 Semantics of the service primitive

Configuration.reply
{
    Initial neighborlist sites MAC/IP
    Software load or alternative site, i.e., neighbor cell for getting them
    Template or parameters or alternative site, i.e., neighbor cell for getting them ability
    Permission for cell to go ready or in-service
}

14.2.2.7.1.3 When generated

This primitive is generated by NCMS after it receives Configuration.request from a BS.

14.2.2.7.1.4 Effect of receipt

Upon receipt, a BS takes actions to load parameters/ obtain software images etc.

14.2.2.7.3 **RF discovery request**

14.2.2.7.3.1 Function

This primitive is issued by a BS to other BSs to determine its functional neighbors.

14.2.2.7.3.2 Semantics of the service primitive

RF_discovery.request
{
    MAC/IP
    Location
    Reply distance – reply if BS within this radial distance
    Reply information – messages to reply in response
}

14.2.2.7.3.3 When generated

This primitive is generated once a BS receives configuration reply from NCMS.

14.2.2.7.3.4 Effect of receipt

Upon receipt, a BS generated RF_discovery.reply is it is within the specified radial distance.

14.2.2.7.4 **RF discovery reply**

14.2.2.7.4.1 Function

This primitive is issued by a BS to inform its presence and relevant parameters to the BS which sent a request.

14.2.2.7.4.2 Semantics of the service primitive

RF_discovery.reply

{
MAC/IP
Location
Status
Site (MAC,BSID,type,EIRP,height,azimuth,antenna type,…)
MOB_NBR-ADV (with BSID and MAC/IP address list)
Page (Paging group, utilization)
Status (READY, INS)
Type – Indoor, rural, urban, sub-urban, …
Antenna type (omni, 30/60/90/2.70 sector, smart, …)
Frequency bands/subchannels
}

14.2.2.7.4.3 When generated
Upon receipt of a RF_discovery.request from a BS if its within the specified radial distance.

14.2.2.7.4.4 Effect of receipt
A BS which receives this primitive parses the message and builds/updates its own parameters.

14.2.2.7.5 **RF ready**

14.2.2.7.5.1 Function
This primitive is issued by a BS to NCMS to indicate that its ready and it communicates its relevant parameters.

14.2.2.7.5.2 Semantics of the service primitive
RF_ready
{
MAC/IP
Location
Status
Site (MAC,BSID,type,EIRP,height,azimuth,antenna type,…)
MOB_NBR-ADV (with BSID and MAC/IP address list)
Page (Paging group, utilization)
Status (READY, INS)
Type – Indoor, rural, urban, sub-urban, …
Antenna type (omni, 30/60/90/2.70 sector, smart, …)
Frequency bands/subchannels
}

14.2.2.7.5.3 When generated
Once a BS builds its parameters list and is in ready state.

14.2.2.7.5.4 Effect of receipt
NCMS creates an entry in its database and also saves its parameters list.

14.2.2.7.6 **RF ready acknowledgement**

14.2.2.7.6.1 Function
NCMS uses this primitive to acknowledge that it has addes the BS to its list.

14.2.2.7.6.2 Semantics of the service primitive
RF_ready.acknowledgement
{
}

14.2.2.7.6.3 When generated
Upon receipt of **RF ready**.

14.2.2.7.6.4 Effect of receipt
Upon receipt of this primitive, a BS starts further actions to go in-service.

14.2.2.7.7 **Neighbor status information**

14.2.2.7.7.1 Function
This primitive is used to setup a new neighbor BS for handoff, the second case is to inform the current list that this BS is going out of service and not to allow handoff attempts to it. ActionTime is used to allow the site to turn on the forward link power and

start to perform call processing. Period is how often the NBR_ADV message should be sent (in seconds) to this BS, 0 for not at all.

14.2.2.7.7.2 Semantics of the service primitive

Neighbor_status_infomation

{

IP address
Location (latitude, longitude)
Status (INS, OOS)
NLOptimization (type)
NBR_ADV period
ActionTime

}

14.2.2.7.7.3 When generated

When a new BS comes up and receives **RF ready ack** from NCMS or when a current BS is to be stut down.

14.2.2.7.7.4 Effect of receipt

Upon receipt of this primitive, a BS updates its current list and prepares an ack for the primitive.

14.2.2.7.8 **Neighbor status acknowledgement**

14.2.2.7.8.1 Function

This primitive is sent by a BS as an ack (if reply threshold is met) to the **Neighbor status information** primitive that it received. The type response is used to acknowledge that the type of handoff messaging optimization is acceptable. If it is not, a lower or less active type is included in the response.

14.2.2.7.8.2 Semantics of the service primitive

Neighbor_status.acknowledgement

{

IP address
Location (latitude, longitude)
Status (INS, OOS)
NLOptimization (type)

}

14.2.2.7.8.3 When generated

Upon receipt of **Neighbor status information** primitive.

14.2.2.7.8.4 Effect of receipt

Upon receipt, a BS updates its parameters and is ready for RF optimization.

14.2.2.7.9 **Local statistics request**

14.2.2.7.9.1 Function

This primitive is sent from a BS to its neighbors in order to access how best to share/ reserve frequencies, load and status.

14.2.2.7.9.2 Semantics of the service primitive

Local_statistics.request

{

IP address
Location
Status
MsgReports
ActionTime
Reporting period – time between reporting
Reporting window – by time/ calls
Number of reports

}

MsgReports: which messages are to be included in the report (RFload, Backhaul, CDL points, …)

ActionTime is request for the first report, or indication of when for tearing down, all 0 values indicate now.

Reporting window is a sliding window so that statistics could be taken over a longer or shorter time than the reporting period.

14.2.2.7.9.3 When generated

Periodic once a BS is in-service. This primitive could be sent as sort fo ping/ keep alive message for status to local BSs.

14.2.2.7.9.4 Effect of receipt

Upon receipt, a BS prepares **Local statistics reply** primitive.

14.2.2.7.10 **Local statistics reply**

14.2.2.7.10.1 Function

A BS sends the requested parameters once it receives Local statistics request from a neighbor BS.

14.2.2.7.10.2 Semantics of the service primitive

Local_statistics.reply

{

IP address
Location
Status (status, cause)
RFloading (state, number of active/primary users, traffic forward, traffic reverse, paging channel utilization, RSSI rise) – per frequency
BackhaulLoading (state, forward/reverse % span utilization)
SubchannelGrouping (split of subchannel groups, symbols, user power distribution) – per frequency
CDLPoints (x,y,z,pathloss – frequency-BS-ID, traffic usage)

}

Cause – periodic, high load

Load status – low, high, nearly congested, congested

14.2.2.7.10.3 When generated

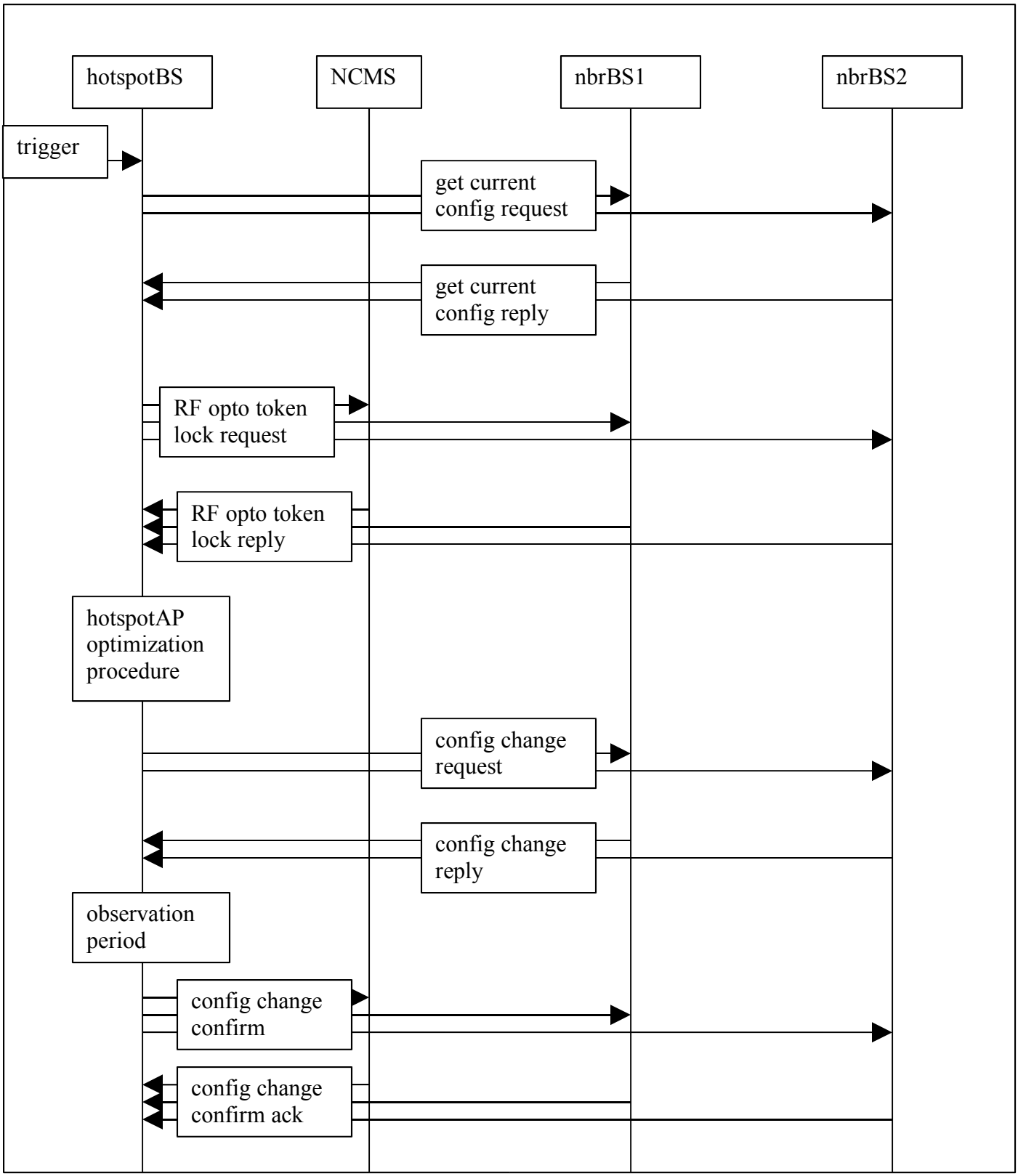
Upon receipt of a **Local statistics request** primitive, a BS generates this primitive.

14.2.2.7.10.4 Effect of receipt

A BS that receives it updates its parameters etc.

Comment # 4

14.2.2.8 BS Initiated Optimization Management



14.2.2.8.1 **Get current configuration request**

14.2.2.8.1.1 Function

A BS that decides to perform a particular optimization issues this primitive to neighbor BSs in order to obtain their latest configuration.

14.2.2.8.1.2 Semantics of the service primitive

Get_current_configuration.request
{
    IP address
    Location
    OptimizationCapabilities
    ConfigurationType
}
OptimizationCapabilities
    Load balancing
    Capacity and coverage
    Subchannel coordination
    Backhaul
    CyclicPrefix
ConfigurationType
    Antenna Parameters
    Preamble power setting
    LPA Power
    Pilot subcarrier power setting
    SubchannelConfiguration
    Loading level
    Backhaul capacity
    Equipment capacity
    CPU utilization

14.2.2.8.1.3 When generated

Upon receipt of one of the optimization triggers.

14.2.2.8.1.4 Effect of receipt

Upon receipt of this primitive, the BS prepares a reply indicating its capabilities and configuration.

14.2.2.8.2 **Get current configuration reply**

14.2.2.8.2.1 Function

This primitive is issued by a BS in reply to a request from a neighbor BS.

14.2.2.8.2.2 Semantics of the service primitive

Get_current_configuration.reply
{
    IP address
    Location
    OptimizationCapabilities
    ConfigurationSetting
}
OptimizationCapabilities
    Load balancing
    Capacity and coverage
    Subchannel coordination
    Backhaul
    CyclicPrefix
ConfigurationSetting
    Antenna parameters setting
        Downtilt, Azimuth, Beamwidth
    Preamble power setting
        % of LPA power
    LPA power setting
        maximum power in Watts
    Pilot subcarrier power setting

% of preamble power
SubchannelConfiguration setting
Backhaul capacity
Mbps/ xDS0?
CyclicPrefix
1/4,1/8,1/16,1/32
Equipment capacity
CPU utilization

14.2.2.8.2.3 When generated
Upon receipt of a Get_current_configuration.reply primitive.

14.2.2.8.2.4 Effect of receipt
The BS that received this primitive updates its data and prepares itself for optimization.

14.2.2.8.3 **RF optimization token lock request**

14.2.2.8.3.1 Function
A BS that decides to perform optimization asks neighbor BSs to lock their current configuration.

14.2.2.8.3.2 Semantics of the service primitive
RF_optimization_token_lock.request
{
HotspotTokenNumber
TimeStamp
SecurityRelated
OptimizationType
}

14.2.2.8.3.3 When generated
Upon receipt of Get_current_configuration.reply.

14.2.2.8.3.4 Effect of receipt
A BS which receives this primitive responds with a reply primitive that either accepts the request or rejects the request by specifying the cause.

14.2.2.8.4 **RF optimization token lock reply**

14.2.2.8.4.1 Function
A BS which receives the RF_optimization_token_lock.request primitive responds with this primitive that either accepts the request or rejects the request by specifying the cause.

14.2.2.8.4.2 Semantics of the service primitive
RF_optimization_token_lock.reply
{
HotspotTokenNumber
TimeStamp
SecurityRelated
OptimizationType
Result
Cause
}
Result
Accept, Reject
Cause (in case of reject)
Lacks OptimizationType Capability
Commited to another optimization process

14.2.2.8.4.3 When generated
Upon receipt of the RF_optimization_token_lock.request primitive from a neighbor BS.

14.2.2.8.4.4 Effect of receipt
A BS which receives this primitive starts its optimization process.

14.2.2.8.5 **Configuration change request**

14.2.2.8.5.1 Function
Once a BS has performed its optimization process, it issues this primitive to effect

configuration changes in its neighbor BSs.

14.2.2.8.5.2 Semantics of the service primitive

Configuration_change.request

{

IP address

Location

OptimizationType

NewConfigurationSetting

}

OptimizationType

NewConfigurationSetting

Antenna parameters setting

Downtilt, Azimuth, Beamwidth

Preamble power setting

% of LPA power

LPA power setting

maximum power in Watts

Pilot subcarrier power setting

% of preamble power

SubchannelConfiguration setting

Backhaul capacity

Mbps/ xDS0?

CyclicPrefix

1/4,1/8,1/16,1/32

Equipment capacity

CPU utilization

}

14.2.2.8.5.3 When generated

Once a BS completes its optimization process.

14.2.2.8.5.4 Effect of receipt

A BS that receives it prepares a reply indicating if it has accepted the changes or not.

14.2.2.8.6 **Configuration change reply**

14.2.2.8.6.1 Function

A BS issues this primitive as a reply indicating if it has accepted the changes indicated by the hotspot BS or not.

14.2.2.8.6.2 Semantics of the service primitive

Configuration_change.reply

{

Result

Cause

}

Result

Accept, Reject

Cause (in case of reject only)

14.2.2.8.6.3 When generated

Upon receipt of Configuration_change.request primitive

14.2.2.8.6.4 Effect of receipt

If accept, the BS starts its observation period window. If reject, it waits for another opportunity for optimization.

14.2.2.8.7 **Configuration change confirm**

14.2.2.8.7.1 Function

A BS once it is sure that the optimization works, issues this primitive to its neighbors confirming the configuration change. Otherwise, it requests neighbor BSs to fall back to original configuration.

14.2.2.8.7.2 Semantics of the service primitive

Configuration_change.confirm

{
Result
Cause
}
Result
Accept, Fallback
Cause (in case of Fallback only)
Optimization does not work

14.2.2.8.7.3 When generated
Once its observation period window timer goes off.

14.2.2.8.7.4 Effect of receipt
As per the indication (accept, fallback), the BS makes changes in its configuration.

14.2.2.8.8 **Configuration change confirm acknowledgement**

14.2.2.8.8.1 Function
To acknowledge that it has received the confirm message and has taken action as per the indication in the confirm message. Also releases the token lock.

14.2.2.8.8.2 Semantics of the service primitive
Configuration_change_confirm.acknowledgement
{
Ack
}

14.2.2.8.8.3 When generated
Upon receipt of Configuration_change.confirm primitive

14.2.2.8.8.4 Effect of receipt
A BS knows that the optimization process is complete and starts its background processes for observing the system dynamics.