PROPOSED AMENDMENTS TO TECHNOLOGY DESCRIPTION TEMPLATE

1 Source information

The content herein was agreed by the IEEE 802.16 Working Group on Broadband Wireless Access at its Session #56 Closing Plenary meeting of 17 July 2008.

2 Discussion

On the basis of Document ITU-R 5D/TEMP/93(Rev.1) (which is identical to Doc. "0093edited" produced at the Dubai meeting), this [draft] contribution proposes some improvements for the completion of the template. Although Document 5D/TEMP/93(Rev.1) contains change marks, these were removed with the understanding that the correspondence group will start with a clean document[1]. New revision marks have been added to the attachment to reflect the proposed amendments.

The rationale/principles used are the following:

- Ensure that the template is in accordance with its purpose, as described in the introductory paragraph, of describing a radio interface technology to a level of detail that will enable assessment of compliance with the minimum technical requirements.
- Avoid duplication within the template.
- Avoid duplication with the compliance templates.
- Avoid reference to parameters that are deemed to be implementation dependent.
- Avoid aspects that do not have a direct relevance to the evaluation of a radio interface technology.
- Suggested re-arrangement of some items, for a consistent grouping.

3 Proposal

We proposed that the amendments shown in the attachment be incorporated in the baseline text.

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[1] It is noted that there was no agreed source document carried forward as a baseline for Doc. 5D/TEMP/93.

Source: Document 5D/TEMP/93(Rev.1)

Technology description template

The purpose of this technology description template is to specify a format for the description of a radio interface technology proposal for IMT-Advanced to a level of detail that will enable assessment of compliance with the minimum technical requirements as specified in [Draft New] Report ITU-R M.[IMT.TECH]. The inclusion of an item in this template shall not imply that it is a minimum requirement of IMT-Advanced. Furthermore, where an item is not relevant it should be answered "N/A" (Not Applicable). It is not mandatory to provide information for each item, recognising that evaluation groups may need to make independent assumptions during their evaluation, or may request additional information from the proponent.

		Item to be described
A1.1		**Test Environment(s)**
		What test environments (described in IMT.EVAL) does this technology description template address?
		If there are any special features to support a particular mobility class please describe those features.
A1.2		**Technological items to describe candidate RIT**
A1.2.1		**Multiple access methods** Which access technology(-ies) does the proposal use: TDMA, FDMA, CDMA, OFDMA, IDMA, SDMA, hybrid, or other? In the case of CDMA, which type of CDMA is used: frequency hopping (FH) or direct sequence (DS) or hybrid? Characterize. What is the chip rate (Mchips/s)? Rate at input to modulator. What is the processing gain? 10 log (chip rate/information rate). Explain the uplink and downlink code structures and provide the details about the types (e.g., pseudo-noise (PN) code, Walsh code) and purposes (e.g., spreading, identification, etc.) of the codes. In the case of OFDMA, what are the sub-carrier spacing, FFT size and CP length? Provide details.
A1.2.2		**Modulation scheme** What is the baseband modulation technique? If both the data modulation and spreading modulation are required, describe in detail.

		Item to be described
A1.2.3		**Error control coding scheme and interleaving** Provide details of error control coding scheme for both downlink and uplink.Provide details of Hybrid ARQ or other retransmission mechanisms. *[IEEE 802.16 Comment: ACM is Addressed in A1.5]* Describe the adaptation methods used.
A1.2.3.1		What is the bit interleaving scheme? Provide detailed description for both uplink and downlink.
A1.2.3.2		Describe the approach taken to cope with multipath propagation effects (e.g., via equalizer, rake receiver, cyclic prefix, etc.). *[IEEE 802.16 Comment: this seems to be misplaced under A1.2.3]*
A1.2.4		**Physical channel structure and multiplexing,**
A1.2.4.1		What is the RF channel bit rate (kbit/s)? NOTE 1 – The maximum modulation rate of RF (after channel encoding, adding of in-band control signalling and any overhead signalling) possible to transmit carrier over an RF channel, i.e. independent of access technology and of modulation schemes.
		[IEEE 802.16 comment: It is unclear how this relates to the evaluation methodology in IMT.EVAL.]
A1.2.4.3		*Variable bit rate capabilities*: describe the ways the proposal is able to handle variable baseband transmission rates. For example, does the RIT use: – Variable data rate as a function of user application? – Variable voice/data channel utilization as a function of traffic mix requirements? Characterize how the bit rate modification is performed. In addition, what are the advantages of the system's variable bit rate capabilities?
A1.2.4.4		What are the user information bit rates in each variable bit rate mode?
A1.2.4.5		*Signalling transmission scheme*: if the candidate RIT uses a signalling transmission scheme different from that for user data transmission, describe the details of the signalling transmission scheme over the radio interface between mobile and base stations.
A1.2.5		**Handover**

		Item to be described
A1.2.5.1		Describe how intersystem handover is achieved.
A1.2.5 .2		Characterize the type of handover strategy (or strategies) supported, e.g., MS assisted handover.
A1.2.6		**Radio resource management** Describe how dynamic and flexible radio resource management is achieved
A1.2.6.1		**Inter-RIT interworking** In the case of an SRIT, the proponent should describe the support of interworking functions between different RITs within the SRIT.
A1.2.6.2		Connection/Session management Describe the support of multiple protocol states with fast and dynamic transitions among them. The proponent should describe how efficient signalling schemes for allocating and releasing resources are provided.
A1.2.7		**Frame structure** describe the uplink and downlink frame structure for each user information rate to give sufficient information such as: – frame length, – the number of time slots per frame, – the number and position of switch points per frame for TDD – guard time or the number of guard bits, – associated control channel (ACCH) bit rate, – power control bit rate.
A1.3		**Spectrum capabilities** NOTE 1 – Parameters for both downlink and uplink should be described separately, if necessary.
A1.3.1		Flexible spectrum use Does the RIT allow flexible spectrum use between operators? If so, provide details. Describe additional capabilities of the RIT or SRIT enabling the flexible use of spectrum
A1.3.3		Channel bandwidth scalability Describe how the capability of the proposed RIT may evolve to support scalable bandwidths higher than 40 MHz.

		Item to be described
A1.3.4		What are the frequency bands supported by the RIT?
A1.3.5		What is the minimum bandwidth required to deploy the system (MHz)?
A1.3.6		What are the minimum and maximum operating channel bandwidths (MHz)?
A1.3.7		What duplexing scheme(s) is (are) described in this template? (e.g. TDD, FDD or half-duplex FDD)
A1.3.8		What is the minimum (up/down) frequency separation for full- and half-duplex FDD?
A1.3.9		What is the requirement of transmit/receive isolation? Does the proposal require a duplexer in either the mobile station (MS) or BS?
A1.3.10		What is the minimum (up/down) time separation for TDD? *[IEEE 802.16 question: is not already covered in A1.2.7?]*
		[IEEE 802.16 comment: already covered in A1.3.1]
A1.3.12		What is the characteristic of the uplink and downlink bandwidth supported for FDD? Symmetric or asymmetric or both?
A1.3.13		Is the DL/UL ratio variable for TDD? What are the DL/UL ratios supported?
A1.3.14		**RF channel characteristics for flexible spectrum usage**
		[IEEE 802.16 Comment: Duplication of A1.3.6]
		[IEEE 802.16 Comment: Duplication of A1.3.3]
A1.3.14.3		Describe multiple contiguous (or non-contiguous) band aggregation capabilities, if any.
A1.3.14.4		Does the RIT support a bandwidth on demand (BOD) capability? BOD refers specifically to the ability of an end-user to request multi-bearer services. Typically, this is given as the capacity in the form of bits per second of throughput. Multi-bearer services can be implemented by using such technologies as multi-carrier, multi-time slot or multi-codes. If so, characterize these capabilities. NOTE 1 – BOD does not refer to the self-adaptive feature of the radio channel to cope with changes in the transmission quality

		Item to be described
A1.4		**Support of advanced antenna capabilities** What kind of multi-antenna scheme supported in the MS, BS or both? Fully describe the antenna systems that can be used and/or have to be used; characterize their impacts on systems performance; e.g., does the RIT have the capability for the use of: – MIMO, – space-time coding (STC) techniques, – adaptive array antennas with real-time beam-forming, with specific attention being paid to increased spectrum efficiencies, increased throughput, power consumption and complexity of the setup.
A1.4.1		How many antennas are supported by BS and MS? Provide both basic and advanced configuration(s).
A1.4.2		If MIMO is used, then: - Single codeword (SCW) and Multi codeword (MCW)? Provide detail. - Precoding? Provide detail. - Open-loop MIMO or Closed-loop MIMO? Provide detail - Cooperative MIMO in single-cell and multi-cell? Provide detail. - Single-User (SU) MIMO or Multi-User (MU) MIMO? Provide detail. - Virtual MIMO in uplink? Provide detail.
A1.4.8		*Antenna systems* : fully describe the antenna systems that can be used and/or have to be used; characterize their impacts on systems performance, (terrestrial only); e.g., does the RTT have the capability for the use of: – remote antennas: describe whether and how remote antenna systems can be used to extend coverage to low traffic density areas; – distributed antennas: describe whether and how distributed antenna designs are used, and in which IMT-Advanced test environments; – other antenna systems.

		Item to be described
A1.5		**<u>Link adaptation and power control</u>** The RIT may use link adaptation techniques such as adaptive modulation and coding, power control, etc. to manage output power, reduce interference, increase the SINR, etc. *Power control characteristics*: Is a power control scheme included in the proposal? Characterize the impact (e.g. improvements) of supported power control schemes on system performance. Provide details of any adaptive modulation and coding schemes. For each different combination of modulation and coding schemes, provide the information requested below
A1.5.1		What is the power control step size (dB)?
A1.5.2		What is the number of power control cycles per second?
A1.5.3		What is the power control dynamic range (dB)?
A1.5.4		What is the minimum transmit power level with power control?
A1.5.5		What is the residual power variation after power control when RIT is operating? Provide details about the circumstances (e.g. in terms of system characteristics, environment, deployment, MS-speed, etc.) under which this residual power variation appears and what impact it has on the system performance.
A1.5.6		Describe the number of transmit power levels
A1.5.7		Describe the associated signalling and control messages.
A1.6		**RF channel parameters** The proponent should provide a description of basic parameters such as - frequency hopping schemes - FFT size (OFDM-based) - chip rate (CDMA) - guard slots (TDMA) and so on. *[IEEE 802.16 Comments: Consider merging the above with A1.2.1]* *[IEEE 802.16 Comments: The following items are a duplication of A1.2.1]*

		Item to be described
A1.8		**Scheduler, QoS support and Management, Data Services** Scheduling mechanisms – Describe the scheduling mechanisms of the proposal and their impact on the system performance. QoS support – How QoS classes are supported in order to meet end-user QoS requirements of the various applications. – How QoS classes associated with each service flow can be negotiated. – QoS attributes including, but not limited to: • data rate (ranging from the lowest supported data rate to maximum data rate supported by the MAC/PHY); • latency (delivery delay); • packet error rate (after all corrections provided by the MAC/PHY layers), and delay variation (jitter); – How is QoS supported when handing off between radio access networks? – How users may utilize several applications with differing QoS requirements at the same time.
A1.9		**Radio interface architecture and protocol stack** Describe Radio interface architecture and protocol stack such as, – Control channel – Logical channel – Transport channel
A1.10		**Location Based Services** Describe any support for location determination**.**

		Item to be described
A1.12		**Unicast, multicast and broadcast** Describe how the RIT supports: – broadcast services, – multicast services, – unicast services, using both dedicated carriers and/or mixed carriers. It is possible that all three services exist simultaneously – please describe how this may be supported.
A1.12.2		Does the RIT support several codecs? Specify the voice coding scheme or codec(s) to be used in proposed RIT?
A1.15		**Interference mitigation within radio interface** Does the proposal support Interference mitigation? If so, describe the corresponding mechanism such as: Describe the approach taken for the receivers (MS and BS) to cope with multipath propagation effects (e.g. via equalizer, Rake receiver, etc.). Describe the robustness to intersymbol interference and the specific delay spread profiles that are best or worst for the proposal. What is the signalling, if any, which can be used for intercell interference mitigation?
A1.16		**Synchronisation requirements** Describe RIT's timing requirements, e.g. – Is BS-to-BS synchronisation required? Provide precise information, the type of synchronisation, i.e., synchronisation of carrier frequency, bit clock, spreading code or frame, and their accuracy. – Is BS-to-network synchronisation required?. – State short-term frequency and timing accuracy of BS transmit signal.
A1.16.1		Describe the synchronization mechanisms used in the proposal, including synchronization between a user terminal and a site.
A1.17		Other Parameters E.g. - Describe any capability of supporting/using repeaters - Multi-hop relay stations - etc.

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