Call for Contributions:

Proposed Contribution to ITU-R WP 8F Regarding IMT-2000 Proposal

Deadline: 27 October 2006 AOE

The IEEE 802.16 Working Group <http://ieee802.org/16> intends to develop a contribution to ITU-R Working Party 8F proposing that ITU-R Recommendation M.1457 be expanded to include, among the IMT-2000 set of radio interface specifications, a specification according to IEEE Std 802.16. The intention is for the contribution to be developed per Circular Letter 8/LCCE/95 <http://itu.int/itudoc/itu-r/archives/rsg/lcce/rsg8/095e.html> and to be submitted well in advance of the January 2007 meeting of WP 8F.

At its Session #45 in September 2006, the Working Group approved an initial description of the specification to be proposed (Attachment 1). It also tasked its ITU-R Liaison Group to operate by correspondence to develop the initial content of the submittal. The correspondence group is tasked to develop the draft materials by 6 November 2006, in advance of Session #46 <http://ieee802.org/16/meetings/mtg46> of 13-16 November 2006.

This Call for Contributions requests input relevant to the content of the documentation by 27 October in order to allow time for the development of a consolidated draft suitable for review within the IEEE 802 process. Input solicited includes:

• Template description of the proposed standard: Comments and additional content regarding Attachment 1 (per Annex 1 of Rec. ITU-R M.1225).

• Specific text for proposed Subclause 5.6 of ITU-R M.1457.

• Contributions suggesting content for the evaluation in Annex 3 of Rec. ITU-R M.1225, including detailed system description as appropriate.

• Per Circular Letter 8/LCCE/95, documentation of justification of additional radio interface, including statement of added value and harmonization activities.

While the Working Group welcomes contributions on these topics, it also invites other ITU-R members to develop, and submit to ITU-R WP 8F, material to supplement and support the proposed IEEE contribution.

The Working Group kindly requests that those intending to contribute to the correspondence activity or contribute directly to ITU-R identify themselves, and the focus of their proposed contributions, to the IEEE 802.16 ITU-R Liaison Group as soon as possible.

The participation of external evaluation groups, as described in Circular Letter 8/LCCE/95, is also welcome.

Submit your contribution as soon as possible, but no later than the **deadline of 27 October 2006**. Contribution document numbers should follow the form “I802.16-06/XXX”, with corresponding file name “I80216-06_XXX.ext”, where “XXX” is the three-digit serial number. Upload contributions to the “ITU” upload directory <http://itu.WirelessMAN.org>. Check the upload directory to see what number is available at time of upload. You can also reserve a serial number there.

Contributions will be considered non-confidential and will be posted for public access on the IEEE 802.16 Web Site <http://ieee802.org/16>.

For further information on contributing or joining the correspondence activity, contact one of the following:

- IEEE 802.16 ITU-R Liaison Official: José Costa <costa AT nortel DOT com>
- IEEE 802.16 Working Group Chair: Roger Marks <rmarks AT nextwave DOT com>

Attachment 1

Notes:

The following is from Annex 1 to Recommendation ITU-R M.1225.

Indicated responses represent the initial view of the 802.16 Working Group. Contributions and comments are welcome on all aspects. Editor notes inviting contributions are included in sections where additional material is needed.

TABLE CONTENTS

A1.1	Test environment support
A1.1.1	In what test environments will the RTT operate? – outdoor to indoor and pedestrian, – vehicular,
A1.1.2	If the RTT supports more than one test environment, what test environment does this technology description template address? One template for all.
A1.1.3	Does the RTT include any features in support of FWA application? Provide detail about the impact of those features on the technical parameters provided in this template, stating whether the technical parameters provided apply for mobile as well as for FWA applications. Yes. Flexible mixed fixed and mobile design. - QoS - Dynamic bandwidth allocation - Continuous and variable bit rate support - Support of nomadic operation - Support of fixed wireless voice and data services - Etc. Yes, see Recommendation ITU-R F.1763 *[Editor's note: perhaps take some text from F.1763?]*
A1.2	Technical parameters NOTE 1 – Parameters for both forward link and reverse link should be described separately, if necessary.
A1.2.1	What is the minimum frequency band required to deploy the system (MHz)? 10 MHz
A1.2.2	What is the duplex method: TDD or FDD? TDD
A1.2.2.1	What is the minimum up/down frequency separation for FDD? N/A
A1.2.2.2	What is requirement of transmit/receive isolation? Does the proposal require a duplexer in either the mobile station (MS) or BS? Does not require a duplexer.
A1.2.3	Does the RTT allow asymmetric transmission to use the available spectrum? Characterize. Yes. The ratio of uplink to downlink transmission can be reconfigured on a system-wide basis.
A1.2.4	What is the RF channel spacing (kHz)? In addition, does the RTT use an interleaved frequency plan? 10000 KHz The RTT does not use an interleaved frequency plan NOTE 1 – The use of the second adjacent channel instead of the adjacent channel at a neighbouring cluster cell is called "interleaved frequency planning". If a proponent is going to employ an interleaved frequency plan, the proponent should state so in § A1.2.4 and complete § A1.2.15 with the protection ratio for both the adjacent and second adjacent channel.
A1.2.5	What is the bandwidth per duplex RF channel (MHz) measured at the 3 dB down points? It is given by (bandwidth per RF channel) × (1 for TDD and 2 for FDD). Provide detail. Nominally 10 MHz (TDD). Measured at the 3 dB down points is roughly about [8.3] MHz, depending on the permutation used. *[Editor's note: more details to be provided]*
A1.2.5.1	Does the proposal offer multiple or variable RF channel bandwidth capability? If so, are multiple bandwidths or variable bandwidths provided for the purposes of compensating the transmission medium for impairments but intended to be feature transparent to the end user? The proposal offers variable RF channel bandwidth capability through the use of OFDMA subchannelization. *[Editor's note: needs tutorial text]*
A1.2.6	What is the RF channel bit rate (kbit/s)? 72000 kbit/s. *[Editor's notes: (1) include assumptions (2) check against other submissions (3) consider listing answers for all modulations]* 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.

A1.2.7	*Frame structure*: describe the frame structure to give sufficient information such as: – frame length, 5 ms – the number of time slots per frame, not applicable (see system description) – guard time or the number of guard bits, – user information bit rate for each time slot, – channel bit rate (after channel coding), – channel symbol rate (after modulation), – associated control channel (ACCH) bit rate, – power control bit rate. NOTE 1 – Channel coding may include forward error correction (FEC), cyclic redundancy checking (CRC), ACCH, power control bits and guard bits. Provide detail. NOTE 2 – Describe the frame structure for forward link and reverse link, respectively. NOTE 3 – Describe the frame structure for each user information rate.
A1.2.8	Does the RTT use frequency hopping? If so, characterize and explain particularly the impact (e.g. improvements) on system performance. No
A1.2.8.1	What is the hopping rate?
A1.2.8.2	What is the number of the hopping frequency sets?
A1.2.8.3	Are BSs synchronized or non-synchronized?
A1.2.9	Does the RTT use a spreading scheme? No
A1.2.9.1	What is the chip rate (Mchip/s)? Rate at input to modulator.
A1.2.9.2	What is the processing gain? 10 log (chip rate/information rate).
A1.2.9.3	Explain the uplink and downlink code structures and provide the details about the types (e.g. personal numbering (PN) code, Walsh code) and purposes (e.g. spreading, identification, etc.) of the codes.
A1.2.10	Which access technology does the proposal use: TDMA, FDMA, CDMA, hybrid, or a new technology? OFDMA. In the case of CDMA, which type of CDMA is used: frequency hopping (FH) or direct sequence (DS) or hybrid? Characterize. Not applicable
A1.2.11	What is the baseband modulation technique? If both the data modulation and spreading modulation are required, describe in detail. QPSK, 16 QAM, 64 QAM for data modulation. Spreading modulation does not apply. What is the peak to average power ratio after baseband filtering (dB)? *[contributions invited]*
A1.2.12	What are the channel coding (error handling) rate and form for both the forward and reverse links? E.g., does the RTT adopt: – FEC or other schemes? Convolutional coding, convolutional Turbo coding. Coding rates: 1/2, 3/4, 5/6, 2/3. Coding repetition rates: 1x, 2x, 4x, and 6x. – Unequal error protection? Provide details. None – Soft decision decoding or hard decision decoding? Provide details. It is an implementation issue not covered by the description. – Iterative decoding (e.g. turbo codes)? Provide details. It is an implementation issue not covered by the description. – Other schemes? No
A1.2.13	What is the bit interleaving scheme? Provide detailed description for both uplink and downlink. *[contributions invited]*
A1.2.14	Describe the approach taken for the receives (MS and BS) to cope with multipath propagation effects (e.g. via equalizer, Rake receiver, etc.). *[contributions invited, see also 14.1 and 14.2 below]*
A1.2.14.1	Describe the robustness to intersymbol interference and the specific delay spread profiles that are best or worst for the proposal.
A1.2.14.2	Can rapidly changing delay spread profile be accommodated? Describe.

A1.2.15	What is the adjacent channel protection ratio? *[contributions invited; need agreement on spectrum mask first]* NOTE 1 – In order to maintain robustness to adjacent channel interference, the RTT should have some receiver characteristics that can withstand higher power adjacent channel interference. Specify the maximum allowed relative level of adjacent RF channel power (dBc). Provide detail how this figure is assumed.
A1.2.16	Power classes *[contributions invited; see sub-questions below]*
A1.2.16.1	*Mobile terminal emitted power* : what is the radiated antenna power measured at the antenna? For terrestrial component, give (dBm). For satellite component, the mobile terminal emitted power should be given in e.i.r.p. (effective isotropic radiated power) (dBm).
A1.2.16.1.1	What is the maximum peak power transmitted while in active or busy state?
A1.2.16.1.2	What is the time average power transmitted while in active or busy state? Provide detailed explanation used to calculate this time average power.
A1.2.16.2	Base station transmit power per RF carrier for terrestrial component
A1.2.16.2.1	What is the maximum peak transmitted power per RF carrier radiated from antenna?
A1.2.16.2.2	What is the average transmitted power per RF carrier radiated from antenna?
A1.2.17	What is the maximum number of voice channels available per RF channel that can be supported at one BS with 1 RF channel (TDD systems) or 1 duplex RF channel pair (FDD systems), while still meeting ITU-T Recommendation G.726 performance requirements? *[contributions invited; see also Rec. ITU-R M.1079]*
A1.2.18	*Variable bit rate capabilities* : describe the ways the proposal is able to handle variable baseband transmission rates. For example, does the RTT use: – adaptive source and channel coding as a function of RF signal quality? – 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 your system proposal associated with variable bit rate capabilities? *[contributions invited]*
A1.2.18.1	What are the user information bit rates in each variable bit rate mode?
A1.2.19	What kind of voice coding scheme or codec is assumed to be used in proposed RTT? If the existing specific voice coding scheme or codec is to be used, give the name of it. If a special voice coding scheme or codec (e.g. those not standardized in standardization bodies such as ITU) is indispensable for the proposed RTT, provide detail, e.g. scheme, algorithm, coding rates, coding delays and the number of stochastic code books. Due to the IP- based characteristics of the radio interface it can utilize any speech codec.
A1.2.19.1	Does the proposal offer multiple voice coding rate capability? Provide detail. Yes. Please refer to system description.
A1.2.20	*Data services* : are there particular aspects of the proposed technologies which are applicable for the provision of circuit-switched, packet-switched or other data services like asymmetric data services? For each service class (A, B, C and D) a description of RTT services should be provided, at least in terms of bit rate, delay and BER/frame error rate (FER). *[contributions invited]* NOTE 1 – See Recommendation ITU-R M.1224 for the definition of: – "circuit transfer mode", – "packet transfer mode", – "connectionless service", and for the aid of understanding "circuit switched" and "packet switched" data services. NOTE 2 – See ITU-T Recommendation I.362 for details about the service classes A, B, C and D.
A1.2.20.1	For delay constrained, connection oriented (Class A).
A1.2.20.2	For delay constrained, connection oriented, variable bit rate (Class B).
A1.2.20.3	For delay unconstrained, connection oriented (Class C).

A1.2.20.4	For delay unconstrained, connectionless (Class D).
A1.2.21	Simultaneous voice/data services: is the proposal capable of providing multiple user services simultaneously with appropriate channel capacity assignment? Yes. *[contributions invited on the details]* NOTE 1 – The following describes the different techniques that are inherent or improve to a great extent the technology described above to be presented. Description for both BS and MS are required in attributes from § A1.2.22 through § A1.2.23.2.
A1.2.22	*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. *[contributions invited]*
A1.2.22.1	What is the power control step size (dB)?
A1.2.22.2	What are the number of power control cycles per second?
A1.2.22.3	What is the power control dynamic range (dB)?
A1.2.22.4	What is the minimum transmit power level with power control?
A1.2.22.5	What is the residual power variation after power control when RTT 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 which impact it has on the system performance.
A1.2.23	*Diversity combining in MS and BS*: are diversity combining schemes incorporated in the design of the RTT? *[contributions invited]*
A1.2.23.1	Describe the diversity techniques applied in the MS and at the BS, including micro diversity and macro diversity, characterizing the type of diversity used, for example: – time diversity: repetition, Rake-receiver, etc., – space diversity: multiple sectors, multiple satellite, etc., – frequency diversity: FH, wideband transmission, etc., – code diversity: multiple PN codes, multiple FH code, etc., – other scheme. Characterize the diversity combining algorithm, for example, switch diversity, maximal ratio combining, equal gain combining. Additionally, provide supporting values for the number of receivers (or demodulators) per cell per mobile user. State the dB of performance improvement introduced by the use of diversity. For the MS: what is the minimum number of RF receivers (or demodulators) per mobile unit and what is the minimum number of antennas per mobile unit required for the purpose of diversity reception? These numbers should be consistent to that assumed in the link budget template of Annex 2 and that assumed in the calculation of the "capacity" defined at § A1.3.1.5.
A1.2.23.2	What is the degree of improvement expected (dB)? Also indicate the assumed conditions such as BER and FER.
A1.2.24	*Handover/automatic radio link transfer (ALT)*: do the radio transmission technologies support handover? Yes Characterize the type of handover strategy (or strategies) which may be supported, e.g. MS assisted handover. Give explanations on potential advantages, e.g. possible choice of handover algorithms. Provide evidence whenever possible. *[contributions invited]*
A1.2.24.1	What is the break duration (s) when a handover is executed? In this evaluation, a detailed description of the impact of the handover on the service performance should also be given. Explain how the estimate was derived.

A1.2.24.2	For the proposed RTT, can handover cope with rapid decrease in signal strength (e.g. street corner effect)? Give a detailed description of: – the way the handover detected, initiated and executed, – how long each of this action lasts (minimum/maximum time (ms)), – the time-out periods for these actions.
A1.2.25	Characterize how the proposed RTT reacts to the system deployment (e.g. necessity to add new cells and/or new carriers) particularly in terms of frequency planning. *[contributions invited]*
A1.2.26	*Sharing frequency band capabilities*: to what degree is the proposal able to deal with spectrum sharing among IMT-2000 systems as well as with all other systems: – spectrum sharing between operators, – spectrum sharing between terrestrial and satellite IMT-2000 systems, – spectrum sharing between IMT-2000 and non-IMT-2000 systems, – other sharing schemes. *[contributions invited]*
A1.2.27	*Dynamic channel allocation*: characterize the dynamic channel allocation (DCA) schemes which may be supported and characterize their impact on system performance (e.g. in terms of adaptability to varying interference conditions, adaptability to varying traffic conditions, capability to avoid frequency planning, impact on the reuse distance, etc.). *[contributions invited]*
A1.2.28	*Mixed cell architecture*: how well does the RTT accommodate mixed cell architectures (pico, micro and macrocells)? Does the proposal provide pico, micro and macro cell user service in a single licensed spectrum assignment, with handoff as required between them? (terrestrial component only). NOTE 1 – Cell definitions are as follows: – pico – cell hex radius: $r < 100$ m – micro: 100 m $< r <$ 1 000 m – macro: $r >$ 1 000 m. The proposed RTT is very well suited for mixed-cell architectures to support various user environments. *[contributions invitedto provide details]*
A1.2.29	Describe any battery saver/intermittent reception capability. *[contributions invited: idle mode, sleep mode, etc.]*
A1.2.29.1	*Ability of the MS to conserve standby battery power*: provide details about how the proposal conserves standby battery power.
A1.2.30	*Signalling transmission scheme*: if the proposed system will use RTTs for signalling transmission different from those for user data transmission, describe the details of the signalling transmission scheme over the radio interface between terminals and base (satellite) stations. The same RTT is used for both user data and signalling transmission.
A1.2.30.1	Describe the different signalling transfer schemes which may be supported, e.g. in connection with a call, outside a call. Does the RTT support: – new techniques? Characterize. – Signalling enhancements for the delivery of multimedia services? Characterize. Flexible message-based signalling scheme is used. See system description for details.
A1.2.31	Does the RTT 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 (see § A1.2.5.1). Yes. *[contributions invited to provide details]*

A1.2.32	Does the RTT support channel aggregation capability to achieve higher user bit rates? No
A1.3	Expected performances. *[contributions invited on the whole of A1.3]*
A1.3.1	For terrestrial test environment only.
A1.3.1.1	What is the achievable BER floor level (for voice)? NOTE 1 – The BER floor level is evaluated under the BER measuring conditions defined in Annex 2 using the data rates indicated in § 1 of Annex 2.
A1.3.1.2	What is the achievable BER floor level (for data)? NOTE 1 – The BER floor level is evaluated under the measuring conditions defined in Annex 2 using the data rates indicated in § 1 of Annex 2.
A1.3.1.3	What is the maximum tolerable delay spread (ns) to maintain the voice and data service quality requirements? NOTE 1 – The BER is an error floor level measured with the Doppler shift given in the BER measuring conditions of Annex 2.
A1.3.1.4	What is the maximum tolerable Doppler shift (Hz) to maintain the voice and data service quality requirements? NOTE 1 – The BER is an error floor level measured with the delay spread given in the BER measuring conditions of Annex 2.
A1.3.1.5	*Capacity*: the capacity of the radio transmission technology has to be evaluated assuming the deployment models described in Annex 2 and technical parameters from § A1.2.22 through § A1.2.23.2.
A1.3.1.5.1	What is the voice traffic capacity per cell (not per sector): provide the total traffic that can be supported by a single cell (E/MHz/cell) in a total available assigned non-contiguous bandwidth of 30 MHz (15 MHz forward/15 MHz reverse) for FDD mode or contiguous bandwidth of 30 MHz for TDD mode. Provide capacities for all penetration values defined in the deployment model for the test environment in Annex 2. The procedure to obtain this value is described in Annex 2. The capacity supported by not a standalone cell but a single cell within contiguous service area should be obtained here.
A1.3.1.5.2	What is the information capacity per cell (not per sector): provide the total number of user-channel information bits which can be supported by a single cell (Mbit/s/MHz/cell) in a total available assigned non-contiguous bandwidth of 30 MHz (15 MHz forward/15 MHz reverse) for FDD mode or contiguous bandwidth of 30 MHz for TDD mode. Provide capacities for all penetration values defined in the deployment model for the test environment in Annex 2. The procedure to obtain this value is described in Annex 2. The capacity supported by not a standalone cell but a single cell within contiguous service area should be obtained here.
A1.3.1.6	Does the RTT support sectorization? If yes, provide for each sectorization scheme and the total number of user-channel information bits which can be supported by a single site (Mbit/s/MHz) (and the number of sectors) in a total available assigned non-contiguous bandwidth of 30 MHz (15 MHz forward/15 MHz reverse) in FDD mode or contiguous bandwidth of 30 MHz in TDD mode.
A1.3.1.7	*Coverage efficiency*: the coverage efficiency of the radio transmission technology has to be evaluated assuming the deployment models described in Annex 2.
A1.3.1.7.1	What is the base site coverage efficiency (km^2/site) for the lowest traffic loading in the voice only deployment model? Lowest traffic loading means the lowest penetration case described in Annex 2.
A1.3.1.7.2	What is the base site coverage efficiency (km^2/site) for the lowest traffic loading in the data only deployment model? Lowest traffic loading means the lowest penetration case described in Annex 2.
A1.3.2	For satellite test environment only
A1.3.2.1	What is the required C/N_0 to achieve objective performance defined in Annex 2?
A1.3.2.2	What are the Doppler compensation method and residual Doppler shift after compensation?
A1.3.2.3	*Capacity*: the spectrum efficiency of the radio transmission technology has to be evaluated assuming the deployment models described in Annex 2.
A1.3.2.3.1	What is the voice information capacity per required RF bandwidth (bit/s/Hz)?
A1.3.2.3.2	What is the voice plus data information capacity per required RF bandwidth (bit/s/Hz)?

A1.3.2.4	*Normalized power efficiency* : the power efficiency of the radio transmission technology has to be evaluated assuming the deployment models described in Annex 2.
A1.3.2.4.1	What is the supported information bit rate per required carrier power-to-noise density ratio for the given channel performance under the given interference conditions for voice?
A1.3.2.4.2	What is the supported information bit rate per required carrier power-to-noise density ratio for the given channel performance under the given interference conditions for voice plus data?
A1.3.3	*Maximum user bit rate (for data)* : specify the maximum user bit rate (kbit/s) available in the deployment models described in Annex 2.
A1.3.4	What is the maximum range (m) between a user terminal and a BS (prior to hand-off, relay, etc.) under nominal traffic loading and link impairments as defined in Annex 2?
A1.3.5	Describe the capability for the use of repeaters.
A1.3.6	*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-2000 test environments; – Smart antennas (e.g., switched beam, adaptive, etc.): describe how smart antennas can be used and what is their impact on system performance; – other antenna systems.
A1.3.7	Delay (for voice)
A1.3.7.1	What is the radio transmission processing delay due to the overall process of channel coding, bit interleaving, framing, etc., not including source coding? This is given as transmitter delay from the input of the channel coder to the antenna plus the receiver delay from the antenna to the output of the channel decoder. Provide this information for each service being provided. In addition, a detailed description of how this parameter was calculated is required for both the uplink and the downlink.
A1.3.7.2	What is the total estimated round trip delay (ms) to include both the processing delay, propagation delay (terrestrial only) and vocoder delay? Give the estimated delay associated with each of the key attributes described in Fig. 6 that make up the total delay provided.
A1.3.7.3	Does the proposed RTT need echo control?
A1.3.8	What is the MOS level for the proposed codec for the relevant test environments given in Annex 2? Specify its absolute MOS value and its relative value with respect to the MOS value of ITU-T Recommendation G.711 (64 k PCM) and ITU-T Recommendation G.726 (32 k ADPCM). NOTE 1 – If a special voice coding algorithm is indispensable for the proposed RTT, the proponent should declare detail with its performance of the codec such as MOS level. (See § A1.2.19)
A1.3.9	Description of the ability to sustain quality under certain extreme conditions.
A1.3.9.1	*System overload (terrestrial only)* : characterize system behaviour and performance in such conditions for each test services in Annex 2, including potential impact on adjacent cells. Describe the effect on system performance in terms of blocking grade of service for the cases that the load on a particular cell is 125%, 150%, 175%, and 200% of full load. Also describe the effect of blocking on the immediate adjacent cells. Voice service is to be considered here. Full load means a traffic loading which results in 1% call blocking with the BER of 1×10^{-3} maintained.
A1.3.9.2	*Hardware failures* : characterize system behaviour and performance in such conditions. Provide detailed explanation on any calculation.
A1.3.9.3	*Interference immunity* : characterize system immunity or protection mechanisms against interference. What is the interference detection method? What is the interference avoidance method?
A1.3.10	Characterize the adaptability of the proposed RTT to different and/or time-varying conditions (e.g. propagation, traffic, etc.) that are not considered in the above attributes of § A1.3.
A1.4	Technology design constraints *[contributions invited on the whole of A1.4]*

A1.4.1	*Frequency stability* : provide transmission frequency stability (not oscillator stability) requirements of the carrier (include long term – 1 year – frequency stability requirements (ppm)).
A1.4.1.1	For BS transmission (terrestrial component only).
A1.4.1.2	For MS transmission.
A1.4.2	*Out-of-band and spurious emissions* : specify the expected levels of base or satellite and mobile transmitter emissions outside the operating channel, as a function of frequency offset.
A1.4.3	*Synchronisation requirements* : describe RTT's timing requirements, e.g. – Is BS-to-BS or satellite land earth station (LES)-to-LES 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? (terrestrial only). – State short-term frequency and timing accuracy of BS (or LES) transmit signal. – State source of external system reference and the accuracy required, if used at BS (or LES) (for example: derived from wireline network, or GPS receiver). – State free run accuracy of MS frequency and timing reference clock. – State base-to-base bit time alignment requirement over a 24 h period (μs).
A1.4.4	*Timing jitter* : for BS (or LES) and MS give: – the maximum jitter on the transmit signal, – the maximum jitter tolerated on the received signal. Timing jitter is defined as r.m.s. value of the time variance normalized by symbol duration.
A1.4.5	*Frequency synthesizer* : what is the required step size, switched speed and frequency range of the frequency synthesizer of MSs?
A1.4.6	Does the proposed system require capabilities of fixed networks not generally available today?
A1.4.6.1	Describe the special requirements on the fixed networks for the handover procedure. Provide handover procedure to be employed in proposed RTT in detail.
A1.4.7	Fixed network feature transparency
A1.4.7.1	Which service(s) of the standard set of ISDN bearer services can the proposed RTT pass to users without fixed network modification.
A1.4.8	Characterize any radio resource control capabilities that exist for the provision of roaming between a private (e.g., closed user group) and a public IMT-2000 operating environment.
A1.4.9	Describe the estimated fixed signalling overhead (e.g., broadcast control channel, power control messaging). Express this information as a percentage of the spectrum which is used for fixed signalling. Provide detailed explanation on your calculations.
A1.4.10	Characterize the linear and broadband transmitter requirements for BS and MS (terrestrial only).
A1.4.11	Are linear receivers required? Characterize the linearity requirements for the receivers for BS and MS (terrestrial only).
A1.4.12	Specify the required dynamic range of receiver (terrestrial only).
A1.4.13	What are the signal processing estimates for both the handportable and the BS? – MOPS (millions of operations per second) value of parts processed by DSP (digital signal processing), – gate counts excluding DSP, – ROM size requirements for DSP and gate counts (kbytes), – RAM size requirements for DSP and gate counts (kbytes). NOTE 1 – At a minimum the evaluation should review the signal processing estimates (MOPS, memory requirements, gate counts) required for demodulation, equalization, channel coding, error correction, diversity processing (including Rake receivers), adaptive antenna array processing, modulation, A-D and D-A converters and multiplexing as well as some IF and baseband filtering. For new technologies, there may be additional or alternative requirements (such as FFTs etc.). NOTE 2 – The signal processing estimates should be declared with the estimated condition such as assumed services, user bit rate and etc.

A1.4.14	*Dropped calls* : describe how the RTT handles dropped calls. Does the proposed RTT utilize a transparent reconnect procedure – that is, the same as that employed for handoff?
A1.4.15	Characterize the frequency planning requirements: – frequency reuse pattern: given the required C/I and the proposed technologies, specify the frequency cell reuse pattern (e.g. 3-cell, 7-cell, etc.) and, for terrestrial systems, the sectorization schemes assumed; – characterize the frequency management between different cell layers; – does the RTT use an interleaved frequency plan? – are there any frequency channels with particular planning requirements? – all other relevant requirements. NOTE 1 – The use of the second adjacent channel instead of the adjacent channel at a neighbouring cluster cell is called "interleaved frequency planning". If a proponent is going to employ an interleaved frequency plan, the proponent should state so in § A1.2.4 and complete § A1.2.15 with the protection ratio for both the adjacent and second adjacent channel.
A1.4.16	Describe the capability of the proposed RTT to facilitate the evolution of existing radio transmission technologies used in mobile telecommunication systems migrate toward this RTT. Provide detail any impact and constraint on evolution.
A1.4.17	Are there any special requirements for base site implementation? Are there any features which simplify implementation of base sites? (terrestrial only)
A1.5	Information required for terrestrial link budget template *[contributions invited on the whole of A1.5]* Proponents should fulfil the link budget template given in Table 6 and answer the following questions. *[contributions invited to fill in Table 6 from Annex 2]*
A1.5.1	What is the BS noise figure (dB)?
A1.5.2	What is the MS noise figure (dB)?
A1.5.3	What is the BS antenna gain (dBi)?
A1.5.4	What is the MS antenna gain (dBi)?
A1.5.5	What is the cable, connector and combiner losses (dB)?
A1.5.6	What are the number of traffic channels per RF carrier?
A1.5.7	What is the RTT operating point (BER/FER) for the required E_b/N_0 in the link budget template?
A1.5.8	What is the ratio of intra-sector interference to sum of intra-sector interference and inter-sector interference within a cell (dB)?
A1.5.9	What is the ratio of in-cell interference to total interference (dB)?
A1.5.10	What is the occupied bandwidth (99%) (Hz)?
A1.5.11	What is the information rate (dBHz)?