**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | Baseline for discussion of a response LS statement to ITU-R WP5A and WP5C | |
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| Re: | [] | |
| Abstract | This document contains the technical tables from a LS from ITU-R WP 5A and WP 5C with suggested changes for a reply. | |
| Purpose | Input to the liaison statements towards ITU-R | |
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# WP5A (based on the preliminary draft)

## 7.1 Close proximity mobile system (CPMS) operating in the frequency band 275-450 GHz

*[Editor’s note: This section currently addresses 2 CPMSs. Possible merger should be discussed in the future meetings, taking into account the advance of the RF device technology and potential interference issues.]*

The expected ranges of technical and operational characteristics for close proximity mobile system planned to operate in the band 275-325 GHz is shown in Table 2.

[Annex 1 proposes two examples of a radio-frequency channel arrangement for land mobile service applications operating in the frequency band 275-450 GHz. Appendix 1 to Annex 1 gives information on propagation attenuation in the frequency band 275-320 GHz.]

TABLE 2

Expected technical and operational characteristics of a land mobile CPMS applications operating   
in the frequency band 275-450 GHz

| Parameters | Values | |
| --- | --- | --- |
| CPRS application operating in the frequency range  275-320 GHz | CPRS application operating in the frequency range  275-450 GHz |
| Frequency band (GHz) | 275-320 | 275-450 |
| Deployment density | Depending on outdoor usage | Depending on outdoor usage |
| Tx output power density (dBW/MHz) |  | Range TBD(calculate tx pwr/bandwidths) |
| e.i.r.p. density(dBW/MHz) |  | Range TBD (see above) |
| Duplex Method | FDD/TDD | TDD/FDD |
| Modulation | OOK/BPSK/QPSK/16QAM/64QAM  BPSK-OFDM/QPSK-OFDM/ 16QAM-OFDM/32QAM-OFDM/64QAM-OFDM | OOK/BPSK/QPSK/16QAM/64QAM  8PSK/8APSK  BPSK-OFDM/QPSK-OFDM/ 16QAM-OFDM/32QAM-OFDM/64QAM-OFDM |
| Average distance between CPMS fixed and mobile devices (m) | 0.1 | 0.1 |
| Maximum between CPRS fixed and mobile devices (m) | 1 | 1 |
| Antenna height (m) | TBD | TBD |
| Antenna beamwidth (degree) | 3-10 | 10-90 |
| Frequency reuse | 1 | 1 |
| Antenna pattern | TBD | Gaussian |
| Antenna polarization | Liner | Linear |
| Indoor CPRS fixed device deployment (%) | 90 | 90 |
| Indoor CPRS fixed device penetration loss (dB) | >100 | >100 |
| Feeder loss (dB) | 2 | 2 |
| Maximum CPRS fixed device output power (dBm) | 10 | 10 |
| Channel bandwidth (GHz) | 2.16/4.32/8.64/12.96/17.28/ 25.92/51.8 | 2.16/4.32/8.64/12.96/17.28/25.92/51.84/69.12/103,68 |
| Transmitter spectrum mask | TBD | TBD |
| Maximum CPRS fixed device antenna gain (dBi) | 30 | 30 |
| Maximum CPRS mobile device antenna gain (dBi) | 15 | 30 |
| Maximum CRPS fixed device output power (e.i.r.p.) (dBm) | 40 | 40 |
| Maximum CRPS mobile device output power (e.i.r.p.) (dBm) | 25 | 40 |
| Average CPRS fixed device activity (%) | 20 | 20 |
| Average CPRS fixed device power (dBm (e.i.r.p)) | 20 | 20 |
| Receiver noise figure typical (dB) | 15 | 8 |

*[Editor's note: Table fields and contents have to be harmonized among use cases]*

*[NICT’s note: We have the same view that two proposals should be harmonized. One possibility is to limit the frequency range 275-325 GHz which supports IEEE802 position. If IEEE802 would prefer to keep the frequency range 275-450 GHz in the Table, NICT would like to propose the new section which summarized three use cases in the frequency range 275-450 GHz and delete section 7.2 and 7.3. IEEE802 should suggest to WP5A to include the technical characteristics of mobile service applications operating in the frequency range 275-450 GHz in the Report for the future work after WRC-19 because these frequency ranges were discussed within IEEE802 and task group for a new standard at these higher frequencies will be formed once industries have interests on wireless applications above 325 GHz.*

*NICT still have a question why the technical parameters in the range 275-450 GHz are exactly same as those in the frequency range 275-320 GHz. Please clarify if you are still interested in keeping these frequency ranges.*

***New section 7.2 Other applications in the frequency range 275-450 GHz***

NEW TABLE

Expected technical and operational characteristics in the frequency band 275-450 GHz

| Parameter | CPRS | Wireless links in data centers | **Intra-device communications** |
| --- | --- | --- | --- |
| Deployment density | TBD | TBD | Depending on outdoor usage |
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|  |  |  |  |

*The following sections 7.2 and 7.3 should be removed if the above proposal is accepted by IEEE802.]*

## 7.2 Wireless links in data centers

The expected ranges of technical and operational characteristics for wireless links in data centers planned to operate in the band 275-450 GHz are shown in Table 3.

TABLE 3

Expected technical and operational characteristics of wireless links in data centers operating   
in the frequency band 275-450 GHz

| Parameter | Values |
| --- | --- |
| Frequency band (GHz) | 275-450 |
| Deployment density | TBD |
| Tx output power density (dBW/MHz) | Range TBD(calculate tx pwr/bandwidths) |
| e.i.r.p. density (dBW/MHz) | Range TBD (see above) |
| Duplex Method | TDD, FDD, SDD |
| Modulation | OOK/BPSK/QPSK/16QAM/64QAM  8PSK/8APSK |
| Maximum distance between devices | 100 m |
| Antenna height (m) | TBD |
| Antenna beamwidth (degree) | < 25 (expected) |
| Frequency reuse | 1 |
| Antenna pattern | Gaussian |
| Antenna polarization | Linear |
| Indoor deployment (%) | 100 |
| Indoor penetration loss (dB) | TBD |
| Maximum device output power (dBm) | 10 |
| Channel bandwidth (GHz) | 2.16/4.32/8.64/12.96/17.28/ 25.92/51.84/69.12/103,68 |
| Transmitter spectrum mask | TBD |
| Maximum device antenna gain (dBi) | 30 |
| Maximum device output power (e.i.r.p.) (dBm) | 40 |
| Maximum device activity (%) | 100 |
| Receiver noise figure typical (dB) | 8 |

*[Editor's Note: Table fields and contents have to be harmonized among use cases]*

## 7.3 Intra-device communications

The expected ranges of technical and operational characteristics for wireless THz intra-device links planned to operate in the band 275-450 GHz are shown in Table 4.

TABLE 4

Expected technical and operational characteristics of wireless THz intra-device links operating   
in the frequency band 275-450 GHz

| Parameter | Value |
| --- | --- |
| Frequency band (GHz) | 275-450 |
| Deployment density | TBD |
| Tx output power density (dBW/MHz) | Range TBD (calculate tx pwr/bandwidths) |
| e.i.r.p. density (dBW/MHz) | Range TBD (see above) |
| Indoor Deployment (%) | TBD |
| Duplex Method | TDD, FDD, SDD |
| Modulation | OOK/BPSK/QPSK/16QAM/64QAM  8PSK/8APSK |
| Maximum distance between devices | <1 m |
| Antenna height (m) | TBD |
| Antenna beamwidth (degree) | 180 -15 |
| Frequency reuse | 1 |
| Antenna pattern | TBD |
| Antenna polarization | Linear |
| Maximum device output power (dBm) | 10 |
| Channel bandwidth (GHz) | 2.16/4.32/8.64/12.96/17.28//25.92/51.84/69.12/103,68 |
| Transmitter spectrum mask | TBD |
| Maximum device antenna gain (dBi) | 20 |
| Typical expected device antenna gain (dBi) | 6 |
| Maximum device output power (e.i.r.p.) (dBm) | 30 |
| Maximum device activity (%) | 100 |
| Receiver noise figure typical (dB) | 8 |

*[Editor's Note: Table fields and contents have to be harmonized among use cases]*

# WP5C(based on the preliminary draft)

TABLE 2

Technical and operational characteristics of the fixed service applications planned to operate

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band (GHz) | 275-316 | 275-321.84 | 380-445 |
| Duplex Method | FDD/TDD | FDD/TDD | FDD/TDD Editor’s note: Other duplex in schemes are possible |
| Modulation | BPSK/QPSK/16QAM/32QAM/64QAM  BPSK-OFDM/QPSK-OFDM/ 16QAM-OFDM/32QAM-OFDM/64QAM-OFDM | BPSK/QPSK/16QAM/32QAM  8PSK, 8APSK  BPSK-OFDM/QPSK-OFDM/ 16QAM-OFDM/32QAM-OFDM | BPSK/QPSK/16QAM/32QAM  8PSK, 8APSK  BPSK-OFDM/QPSK-OFDM/ 16QAM-OFDM/32QAM-OFDM |
| Channel bandwidth (GHz) | Based on 200 MHz slots  [2.16/4.32/8.64/12.96/17.28/25.92/51.84] | Based on 200 MHz slots  [2.16/4.32/8.64/12.96/17.28/25.92/51.84/69.12] | Based on 200 MHz slots  [2.16/4.32/8.64/12.96/17.28/25.92/51.84] |
| Tx output power range (dBW) | -20 … 0 | -30 … 10 | -30 … 10 |
| Tx output power density range (dBW/GHz) | -4.7 … -0.3 | TBD (calculate based on power and BW) | (calculate based on power and BW) |
| Feeder/multiplexer loss range (dB) | 0 … 3 | 0 … 3 | 0 … 3 |
| Antenna gain range (dBi) | 24 … 50 | 24 … 50 | 24 … 50 |
| Antenna pattern | Gaussian beam | Gaussian beam | Gaussian beam |
| Antenna height (m) | 10-20m | 10-50 | 10-50 |
| Antenna elevation | TBD | +/- 24 deg. | +/-24 deg. |
| e.i.r.p. range (dBW) | 1 … 50 | -9… 60 | -9 … 60 |
| e.i.r.p. density range (dBW/GHz) | 2.3 …. 4.7 | calculate see above | calculate see above |
| Receiver noise figure typical (dB) | 15 | 8 | 8 |
| Receiver noise power density typical (=*NRX*) (dBW/GHz) | -16 | -106 | -106 |
| Normalized Rx input level for 1 × 10–6 BER (dBW/GHz) | TBD | TBD (SNR of 7.5 dB for BPSK required) | TBD (SNR of 7.5 dB for BPSK required) |
| Nominal long-term interference power density (dBW/GHz) | TBD | TBD | TBD |
| Link length (m) | 100 … 300 | 100 … 300 | 100 … 300 |
| Deployment Density | TBD | 10/km^2? | 10/km^2? |

*[NICT’s note: The frequency range 275-316 GHz and 275-321.85 GHz should be harmonized into 375-325 GHz. If IEEE802 in not interested in the range 380-445 GHz, please delete this column. NICT would prefer to focus on the specific frequency range to be identified. We can make another section which suggests the future work for WP5C after WRC-19.]*