**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **TG10 Scenario Parameters** | |
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| Re: | [[TGD Scenario Parameters #319r0](https://mentor.ieee.org/802.15/dcn/14/15-14-0319-00-0010-tgd-scenario-parameters.docx)] | |
| Abstract | [Scenario Parameters for CfFP - Working Document.] | |
| Purpose | [To discuss the parameter table modification in #338] | |
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|  | | **Scenarios** | | | |
| **Parameter** | | **Mostly Upstream:**  **Smart metering, infrastructure monitoring, Irrigation Optimization** | **Mostly Downstream:**  **Street lighting, smart lighting** | **Balanced upstream and downstream:**  **CEMS, BEMS, HEMS** | **P2P:**  **Variety of application** |
| Packet size | | 100 bytes | | | 31 bytes,  255 bytes,  2047 bytes |
| Data rate | | 100kbps, 250kbps [1][2] | | | 20kbps, 250kbps[5], 2Mbps[6] |
| Packet birth rate | | 1 packet every 30 min[[1]](#endnote-1) |  |  | 1 packet/min,  1 packet/30min |
| Duty cycle | | 100%, 1%[[2]](#endnote-2), 0.1%[[3]](#endnote-3) | | |  |
| Node density | | 8000 / km2 (household density in Tokyo) [3] |  |  |  |
| Mobile devices (Y/N) - speed | | N | N | N | Y – 1.4m/s (human walking speed) |
| Number of entry points | | M-1 | 1 | M-1, 1 | 1, 3 |
| Number of exit points | | 1 | M-1 | 1, M-1 | 1, 3 |
| PAN Coord to Device | Unicast (Y/N) | Y | | | Y |
| Multicast (Y/N) | Y | | | Y |
| Broadcast (Y/N) | Y | | | Y |
| Device to PAN Coord | | Y | Y | Y | Y |
| Device to device | Unicast (Y/N) | N | N | N | Y |
| Multicast (Y/N) | N | N | N | Y |
| Broadcast (Y/N) | N | N | N | Y |
| Multiple devices to device (Y) [4] | |  |  |  | Y |
| Number of PAN coordinators [4] | | 1 | 1 | 1 | 1, 3 |
| Linear Topology (Y/N) | | N | Y | N | N |
| Energy consumption | TX | 28 mA [1] | 30 mA [2] | |  |
| RX | 11.2 mA [1] | 37 mA [2] | |  |
| Idle | 1.5 uA [1] | 500 uA [2] | |  |
| Sleep | 0.1 uA [1] | 0.2 uA [2] | |  |
| Tx power | | 13 dBm [1] | 0 dBm | |  |
| Rx sensitivity | | - 97 dBm [1] | -92 dBm [2] | |  |

**Definitions**:

Data rate: data rate at the physical layer

Packet birth rate: rate at which packets are being generated at the application layer of the device

Duty cycle: ratio of awake/asleep time of a device

Device: node other than the PAN coordinator

M: Number of nodes in the PAN

M = 121 (11x11), 1089 (33x33), 10,000 (100x100)

For Linear Topology M = 1089 (33x33), where the middle row or column has M =100

Unicast: transmission from 1 source to 1 destination

Multicast: transmission from 1 source to n destinations (m < M -1)

m=11 for M=121, m=33 for M =1089, and m=100 for M =10000

Broadcast: transmission from 1 source to M -1 destinations

Multiple devices to device: transmission from n devices to one device

m=11 for M =121, m=33 for M =1089, and m=100 for M =10000

**References**

1. <http://www.semtech.com/images/datasheet/sx1272.pdf>
2. MC13202, Low power transceiver for the IEEE 802.15.4 Standard, http://cache.freescale.com/files/rf\_if/doc/data\_sheet/MC13202.pdf?pspll=1&Parent\_nodeId=1141674020187711908069&Parent\_pageType=product
3. Tokyo statistical yearbook, Population and Households, <http://www.toukei.metro.tokyo.jp/tnenkan/2012/tn12qa021000.xls>
4. 15-14-0239-02 Proposed operational scenarios of L2R networks for TG10 TGD
5. C. Townsend, S. Arms (2005). Wireless Sensor Networks: Principles and Applications. In J.S. Wilson (Ed), Sensor Technology Handbook (pp. 575-589). Oxford, UK: Elsevier.
6. Nordic Semiconductor, nRF24L01+, https://www.sparkfun.com/datasheets/Components/SMD/nRF24L01Pluss\_Preliminary\_Product\_Specification\_v1\_0.pdf

1. It is relaxed when the nodes in the network work with a certain duty cycle. [↑](#endnote-ref-1)
2. Packet birth rates are 1/30 packet/min for 11x11, 1/3 packet/hour for 33x33 and 1 packet/day for 99x99. [↑](#endnote-ref-2)
3. Packet birth rates are 1/3 packet/hour for 11x11 and 1 packet/day for 33x33. No scenario for 99. [↑](#endnote-ref-3)