**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |
| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **<Functionality comparison of the proposals>** |
| Date Submitted | September 4, 2014 |
| Source | \*[Verotiana Rabarijaona, Fumihide Kojima], †[Hiroshi Harada] \*[NICT], †[Kyoto University]\*[3-4, Hikarino-oka, Yokosuka, 239-0847 Japan], †[36-1 Yoshida-Honmachi, Sakyo-ku, Kyoto 606-8501 Japan] | Voice: [+81-46-847-5075]Fax: [+81-46-847-5089]E-mail: [rverotiana@nict.go.jp] |
| Re: |  |
| Abstract | List of functionalities extracted from the TGD and from the proposals |
| Purpose | This document is to be used to compare the proposals in terms of functionalities |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

**Introduction**

This document presents a list of the functionalities of the TGD described with a formal statement (in *italic*), and other functionalities specific to each proposal. The table state whether the functionalities are supported and how they are addressed by each proposal when possible. This document is to be used as a comparison basis for the merging/down-selection process.

1. **Functionalities from the TGD**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Functionality** | **NICT** | **OKI** | **ETRI 1(Hybrid L2R)** | **ETRI 2 (TCT)** |
| Mesh topology discovery | Yes(enhanced beacons)Topology: Hierarchical mesh tree | Yes(Hello frames)Topology: Tree | Yes(PANN and PANN RP)Topology: Tree, mesh  | Yes(scan/listen frames)Tiered cluster tree, intra/inter mesh link |
| Mesh Routing | Yes-US: Hop-by-hop from child to parent or brother using neighbor table-DS:  \* Hop-by-hop parent to child or brother using neighbor table,  \* Proactive source routing-P2P: Combination of US and DS | Yes-US: Hop-by-hop child to parent using neighbor table-DS: source routing\* Storing mode; hop-by-hop with routing table can be applicable-P2P: Combination of US and DS | Yes-US, DS: Hop-by-hop using routing table-P2P: route establishment with PREQ and PREQ RP, then Hop by hop using routing table | Yes-US, DS: \* cluster-by-cluster using cluster table \* hop-by-hop within a cluster using Cskip addressing and route table- P2P: Combination of US and DS |
| Extensible mesh routing architecture (metric alternative, selection, notification, new metrics) | Using the Link quality metric field in EB for 1 or more metrics | Using the Neighbor metric container in Hello frames for 1 or more metrics | Using the Metric field in PANN and PREQ for 1 metric | Using the link quality metric field in link management frame and the route metric field in route management frame |
| Unicast | Yes | Yes | Yes | Yes |
| Broadcast | Yes: packet forwarded once if at least 1 child exists | Flooding with random jitter  | Flooding based | frame relaying on default link or shared link |
| Route discovery | Proactive | Proactive | US/DS: proactiveP2P: reactive | Proactive: scheduled updateReactive: on demand update |
| Low power operation | To see from the simulations results |
| Mesh Security | Only devices from the same PAN sharing the same security credentials can belong to a routing tree  | Defined during bootstrapping (example using KMP in the proposal) | Routing for associated device only (BE)Routing for devices only from the same PAN (NBE) | Low level: frame encryption with TG9 KMPHigh level: AAA server for link network |
| Routing metrics | Any metric.SINR used in simulation | Any metric.Hop count used in simulation | Any metricInactive Overhead Aware Link Metric used in simulation | Any metric-Link cost: Function of link type, link quality, load balance-Route cost: number of hops |
| Discovery and association | EBR/EB | Hello request/Hello | PANN/PANN RP | scan/listen frame/ link setup(SETUP\_REQ/RESP) |
| Network acknowledgement | Not specified | E2E-ACK | Not specified | Link layer flow control (FLOW\_REQ/RESP) |
| Addressing modes | 16/64 bits | 16/64 bits | 16/64 bits | 16 bits (c-skip)/64 bits |
| Changes to the MAC and PHY | New IEs-HMT construction IE-L2R routing IE-Data aggregation IE-Destination announcement IE | New IE with nested IEs-L2R IE \*Address list IE \*Hello Param IE \*Routing Instance IE \*Hello request parameter IE\*Route record parameter IE\*MGT request parameter IE\*MGT response parameter IE\*KMP relay parameter IE\*FA notification parameter IE\*FA channel update IE\*MC request parameter IE\*MC response parameter IE\*Neighbor metrics container IE\*PIB ID list IE \*KMP content IE | New control frames- PANN- PANN-RP- PREQ- PREQ-RP | New IEs-L2R IE \*setup req\*release req\*Hello req\*setup resp\*release resp\*hello resp-L2R payload IE\*Cluster req\*Update req\*Leave req\*flow req\*cluster resp\*Update resp\*leave resp\*flow\_resp |
| Multiple entry and exit points | YesUsing the service/gateway, Tree root IDs fields | YesTwo proposals:1. Wired connected between the PAN coordinator and one hop neighbors2. Multi-instance differentiated by instance ID  | YesUsing the multiple PANN messages from multiple gateways | YesUsing the cluster root router |

1. **Other functionalities**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Functionality** | **NICT** | **OKI** | **ETRI 1(Hybrid L2R)** | **ETRI 2 (TCT)** |
| Cross PAN routing | n/a | n/a | Yes | n/a |
| Data aggregation | Yes | n/a | n/a | n/a |
| High reliability (AR always set to 1 and retransmission to alternative brother or parent) | Yes | n/a | n/a | n/a |
| Hop-by-hop retry (retransmission to candidates of parent) | Yes | Yes | n/a | YesRedundant link path on a dedicated link |
| Multicast routing | YesUsing multicast subscription IE | No MC routing.Broadcasting + filtering basis | YesUsing multicast option field in routing table and control messages | YesHierarchical multiple 1-1 link path at a cluster root |
| Multi-channel aware | n/a | n/a | Yes (TMCTP) | n/a |
| Transparent link to network layer | YesMulti-hop at L2 appears as 1 IP hop | YesMulti-hop at L2 appears as 1 IP hop | YesMulti-hop at L2 appears as 1 IP hop | Virtual link:Multi-hop link connection through the routers which perform frame relaying |
| Multiple grades of mesh connection | n/a | n/a | n/a | Dedicated link/ shared link/ |