**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Comments on TCT Routing Functionality** |
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| Re: |  |
| Abstract | Comments on the functionalities of TCT routing in doc. IEEE 802.15-14-0520-00. |
| Purpose | This document is to be used to compare the proposals in terms of functionalities |
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**Introduction**

This document presents the revision of the TCT routing functionalities described in doc. IEEE802.15-14-0520-00.

1. **Functionalities from the TGD**

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| **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 | Yes(scan/listen frames)Topology: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-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  |  | Yes: 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  | KMP |  | 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 | Inactive Overhead Aware Link Metric | 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(c-skip)/64bits |
| 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 |  |  | YesUsing the cluster root router |

1. **Other functionalities**

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| **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 (retransmission to alternative neighbor) | Yes | n/a | n/a | YesRedundant link path on a dedicated link  |
| Multicast routing | YesUsing multicast subscription IE |  |  | YesHierarchical multiple 1-1 link path at a cluster root |
| Transparent link to network layer |  |  |  | Virtual link:Multi-hop link connection through the routers which perform frame relaying |
| Multiple grades of mesh connection |  |  |  | Dedicated link/ shared link/ default link |
| Multiple grade of data service |  |  |  | Multiple grades frame forwarding:selecting link type and flow control on a link path |