Unified L2 Abstractions for L3-Driven Fast Handover

draft-irtf-mobopts-l2-abstractions-01

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ToC

- Gap Analysis against IEEE 802.21
- WG Feedbacks
  - from Christian Vogt and Jukka MJ Manner
  - Thank you!
- Questions to WG
Gap Analysis against IEEE 802.21
802.21: Key Services

Applications (VoIP/RTP)
- Connection Management
- Handover Policy
- Handover Management

Mobility Management Protocols
- Smart Triggers
- Handover Messages
- Information Service

802.21 MIH Function
- L2 Triggers and Events
- Handover Messages
- Information Service

Network Information
- Available Networks
- Neighbor Maps
- Network Services

Protocols and Device Hardware
- WLAN
- Cellular
- WMAN
L2-abstractions: Overview

- A part of an inter-layer information exchange
  - L2 Information Services
  - L2 Triggers
  - L2 Commands
- Not only between L2 and L3 but also between any layers
  - This is why protocol layer id is defined
- Focus on information only inside MN
- 9 primitives are defined

AE Abstract Entity
PE Protocol Entity
## Primitive Mapping

<table>
<thead>
<tr>
<th>L2-abst</th>
<th>802.21</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Primitive</td>
<td>Event type</td>
</tr>
<tr>
<td>1</td>
<td>L2-LinkStatus</td>
<td>MIH Commands</td>
</tr>
<tr>
<td>1</td>
<td>L2-PeerList</td>
<td>MIH Commands</td>
</tr>
<tr>
<td>2</td>
<td>L2-PeerFound</td>
<td>MIH Events (State Change)</td>
</tr>
<tr>
<td>2</td>
<td>L2-PeerLost</td>
<td>MIH Events (State Change)</td>
</tr>
<tr>
<td>2</td>
<td>L2-LinkUp</td>
<td>MIH Events (State Change)</td>
</tr>
<tr>
<td>2</td>
<td>L2-LinkDown</td>
<td>MIH Events (State Change)</td>
</tr>
<tr>
<td>2</td>
<td>L2-LinkGoingDown</td>
<td>MIH Events (Predictive)</td>
</tr>
<tr>
<td>3</td>
<td>L2-LinkConnect</td>
<td>MIH Commands</td>
</tr>
<tr>
<td>3</td>
<td>L2-LinkDisconnect</td>
<td>MIH Commands</td>
</tr>
</tbody>
</table>

(*1) 802.21 does not perform an anticipatory indication e.g. LinkGoingDown
# 802.21 Services Not Defined in L2-abst

## MIH Events

<table>
<thead>
<tr>
<th>No</th>
<th>Event Type</th>
<th>Event Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>State Change</td>
<td>Link Detected</td>
<td>New L2 link has been found</td>
</tr>
<tr>
<td>5</td>
<td>State Change</td>
<td>Link Parameters Change</td>
<td>Change in specific link parameters has crossed pre-specified thresholds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(link Speed, Quality metrics)</td>
</tr>
<tr>
<td>6</td>
<td>Administrative</td>
<td>Link Event Rollback</td>
<td>Event rollback</td>
</tr>
<tr>
<td>7</td>
<td>Link Transmission</td>
<td>Link SDU Transmit Status</td>
<td>Improve handover performance through local feedback as opposed to waiting for end-to-end notifications</td>
</tr>
<tr>
<td>8</td>
<td>Link Synchronous</td>
<td>Link Handover Imminent</td>
<td>L2 intra-technology handover imminent (subnet change). Notify Handover information without change in link state.</td>
</tr>
<tr>
<td>9</td>
<td>Link Synchronous</td>
<td>Link Handover Complete</td>
<td>Notify handover state</td>
</tr>
</tbody>
</table>
## MIH Commands

<table>
<thead>
<tr>
<th>No</th>
<th>Command Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>MIH Configure</td>
<td>Configure a link</td>
</tr>
<tr>
<td>4</td>
<td>MIH Configure Threshold</td>
<td>Configures thresholds for link events</td>
</tr>
<tr>
<td>5</td>
<td>MIH Scan</td>
<td>Scan a link</td>
</tr>
<tr>
<td>6</td>
<td>MIH Handover Initiate</td>
<td>Network initiates handover and sends a list of suggested networks and associated PoA</td>
</tr>
<tr>
<td>7</td>
<td>MIH Handover Prepare</td>
<td>This command is sent by current MIHF entity to target MIHF entity to allow for resource query and handover preparation.</td>
</tr>
<tr>
<td>9</td>
<td>MIH Handover Complete</td>
<td>Notification from new serving MIHF to previous serving MIHF indicating handover completion, and any pending packets may now be forwarded to the new MIHF.</td>
</tr>
<tr>
<td>10</td>
<td>MIH Network Address Information</td>
<td>Sent from current serving MIHF entity to target MIHF entity to obtain reconfigured network address on target network for the client.</td>
</tr>
</tbody>
</table>
Gap Analysis against P802.21

- Architectural Differences
  - 802.21 defines an MIH function as a shim layer between L2 and L3
  - L2-abst does NOT use an intermediate shim layer between L2 and L3. It is a part of an inter-layer information exchange
  - L2-abst exchanges information between any layers
  - L2-abst requires modifications only to the mobile node

- Types of Services
  - L2-abst provides:
    - Link Layer Triggers (= primitive type 2)
    - Handover Commands (= primitive type 3)
    - Information Service (primitive type 1)
  - L2-abst does NOT provide:
    - Network Information Services
  - 802.21 offers more services (20+ v.s. 9)
WG Feedbacks
Figure 1

- Title (Primitives) is confusing
  - We will change it to “Interaction Model between Layers”
- Do we really need “Response”?
  - We would like to keep it as the interaction model
- “Confirm” and “Response” are confusing
  - Christian suggested to swap them. We will ask the WG later, Q1
3 Types of Primitives

- The relation between the interaction model and primitives was not clear
  - Type 1: To provide L2 information to upper layers immediately
  - Type 2: To notify upper layers of L2 events asynchronously
  - Type 3: To control L2 actions from upper layers
- We will mention this in the beginning of Sec. 4

<table>
<thead>
<tr>
<th></th>
<th>request</th>
<th>confirm</th>
<th>indication</th>
<th>response</th>
</tr>
</thead>
<tbody>
<tr>
<td>type1</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
</tr>
<tr>
<td>type2</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>△</td>
</tr>
<tr>
<td>type3</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

〇・・Mandatory  △・・Optional
Do we need “Protocol ID”?  

- There are more than one protocols in a layer. Protocol ID is necessary to identify a protocol  

- Example:  
  - Layer 3: IPv4, IPv6  
  - Layer 2: Ethernet, CDMA
“Peer” is confusing

- “Peer” has widely accepted end-to-end meaning, where a peer of node X is another node Y with X communicates at application layer
- Defining the peer to be an access point may be confusing
- Christian suggested to use “Point of Attachment” instead. We will ask the WG later, Q2
Registration Procedure

- The registration procedure is unclear
  - Request of type 2 must contain a parameter which directs to “enable” or “disable” event indication
  - Indications are sent as registered events occur until disabled
- We will add more text in the beginning of Sec. 4
When PeerLost is sent?

- L2 creates a list of APs when it performs a scanning.
- Next time a scanning is performed, it creates a new list and compares with the old one.
- If there are differences, correspondent indications will be sent.
  - PeerLost, PeerFound, etc.
- However, the timing of the scanning is an implementation issue.
How do we play with Channels?

- Jukka asked how L2 plays with channels

- L2-PeerList allows to get Peers on difference channels

- However, L3 does not need to specify channels
  - L3 just specifies a Peer and L2 understands which channel the Peer uses
Questions to WG
Q1: Interaction Naming

- A: (current)

- B: (Christian’s Suggestion)
Q2: Peer to PoA

- Christian suggested to use “Point of Attachment” instead of “Peer”

- Do you agree to use PoA (Point of Attechment)? Or any other suggestions?
Q3: Do we consider Infrastructure mode only?

- Jukka asked if it works with ad-hoc or mesh mode
  - It is out of scope. However, what about the WG interest?

- Do we need to support ad-hoc mode or mesh network as well?
  - YES/NO
Q4: Security Awareness?

- Jukka suggested to add some kind of security awareness
  - i.e. whether the link is secure or not, to the link status primitive or to a filter associated to the PeerFound

- Do we need to support such security awareness?
  - YES/NO

- But, how can we abstract security awareness?
  - Maybe, ON or OFF is not enough.
  - e.g. Some requires 128bit WEP, not 40bit WEP. It is very difficult to say how secure the link is.
Q5: Remove an anticipatory indication?

- Christian suggested:
  - to replace L2-LinkGoingDown indication by periodic or on-demand link status reports which notify an interested upper-layer protocol of link status changes
  - the upper-layer protocol can then make its own projections

- Proposal: replace L2-LinkGoingDown by L2-LinkStatusChange
  - YES/NO
End of Slides

Thank you!