Multiple Care-of Address Registration + IEEE802.21 with NEMO Basic Support

Keio University/WIDE Project

Kyocera Corporation

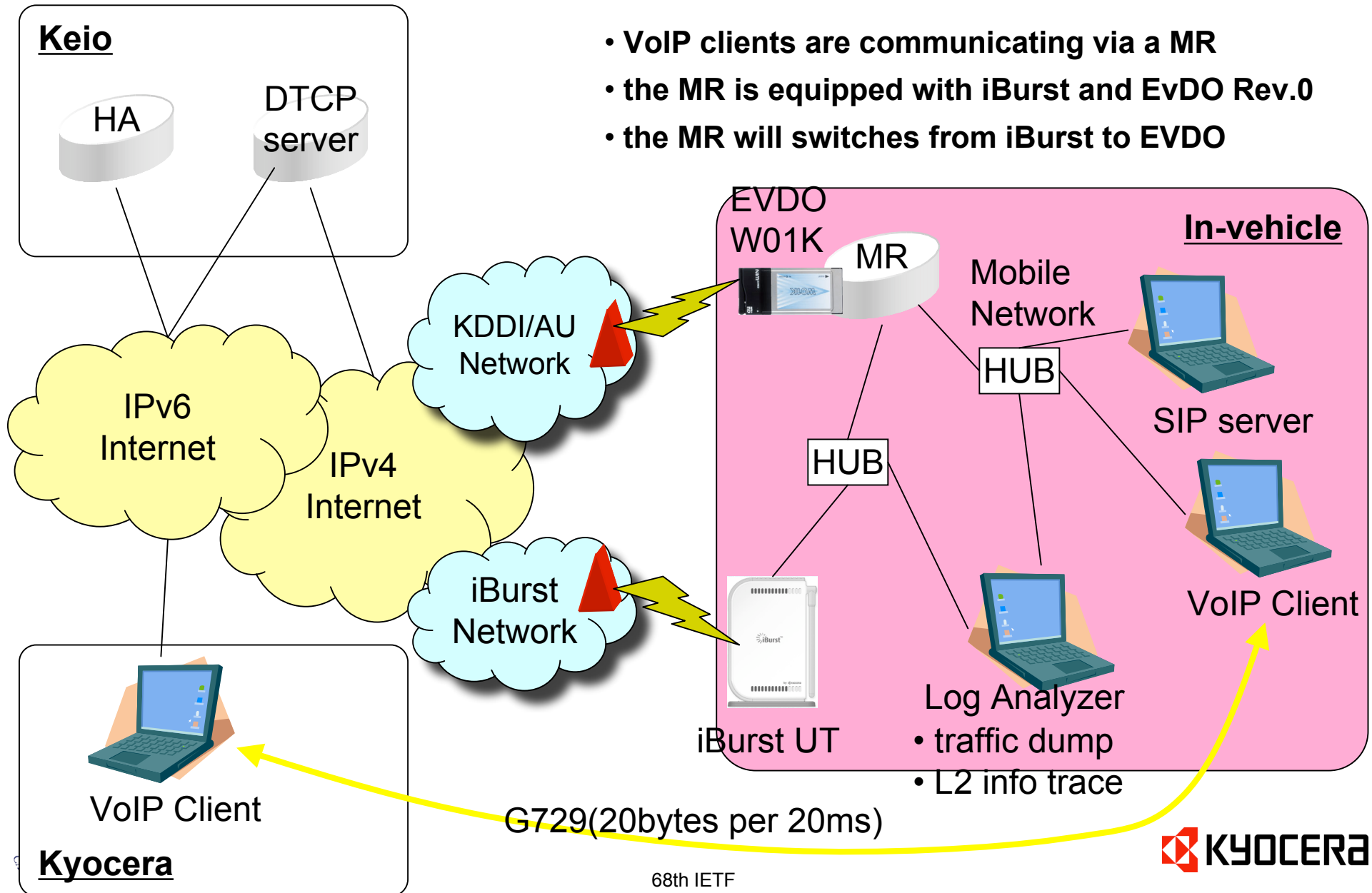# Introduction

- ## Background
  - ### Multiple Care-of Address Registration (MCoA)
    - It is proposed to support multihomed mobile nodes in Monami6 WG
    - WIDE had several experiments/demonstrations using MCoA
  - ### 802.21
    - L2 information is used for efficient handovers but it is often maintained for each network access devices in different manner
    - We thus have interesting to use IEEE802.21

- ## Purpose
  - Study how we can use IEEE802.21 on MCoA enabled MIP/NEMO

    NEMO + MCoA + 802.21

  - Confirmed how it works!

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Experiment Testbsd

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HA

DTCP server

- **VoIP clients are communicating via a MR**
- **the MR is equipped with iBurst and EvDO Rev.0**
- **the MR will switches from iBurst to EVDO**

EVDO
W01K

MR

In-vehicle

Mobile Network

KDDI/AU Network

HUB

SIP server

IPv6 Internet

IPv4 Internet

HUB

VoIP Client

iBurst Network

iBurst UT

Log Analyzer
- traffic dump
- L2 info trace

VoIP Client

**Kyocera**

G729(20bytes per 20ms)

iBurst

- A metropolitan-wide wireless broadband system developed by Kyocera and ArrayComm
- TDMA/TDD based wireless broadband system
  - adaptive-array antenna, SDMA, Link Adaptation
- 1Mbps downlink per user
  - maintains stable high-speed communications even while multiple users are concurrently connected
- Excellent range (approx. 12 km radius)
- Reliable mobile handover between coverage areas
- all IP-based network

http://global.kyocera.com/prdct/telecom/office/iburst/technology.html

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Test Scenarios

- Case 1 : NEMO + MCoA + two types of link triggers
  - MCoA with 802.21 L2 triggers
  - We define two thresholds to notify the status changes:
    - L2-Prepare (GOOD to FAIR) for MCoA path establishment
    - L2-GoingDown (FAIR to BAD) for switching active interfaces
- Case 2 : NEMO + two indications
  - Use the two thresholds by 802.21 trigger as well
  - Without MCoA
- Case 3 : NEMO + one indication
  - Use only the switching threshold
- Case 4 : NEMO only
  - No interaction with L2
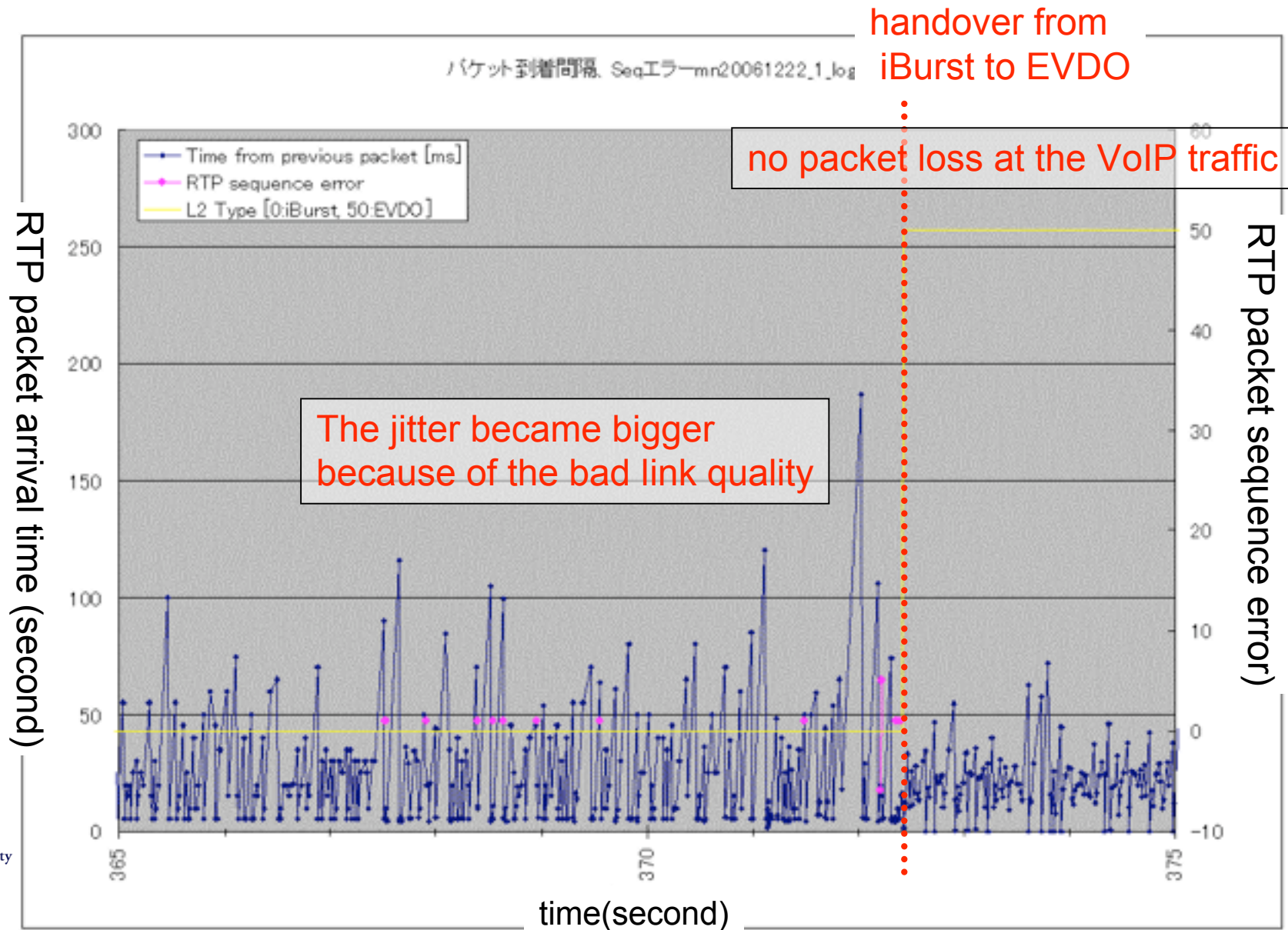
System Flow (Case 1)

68th IETF
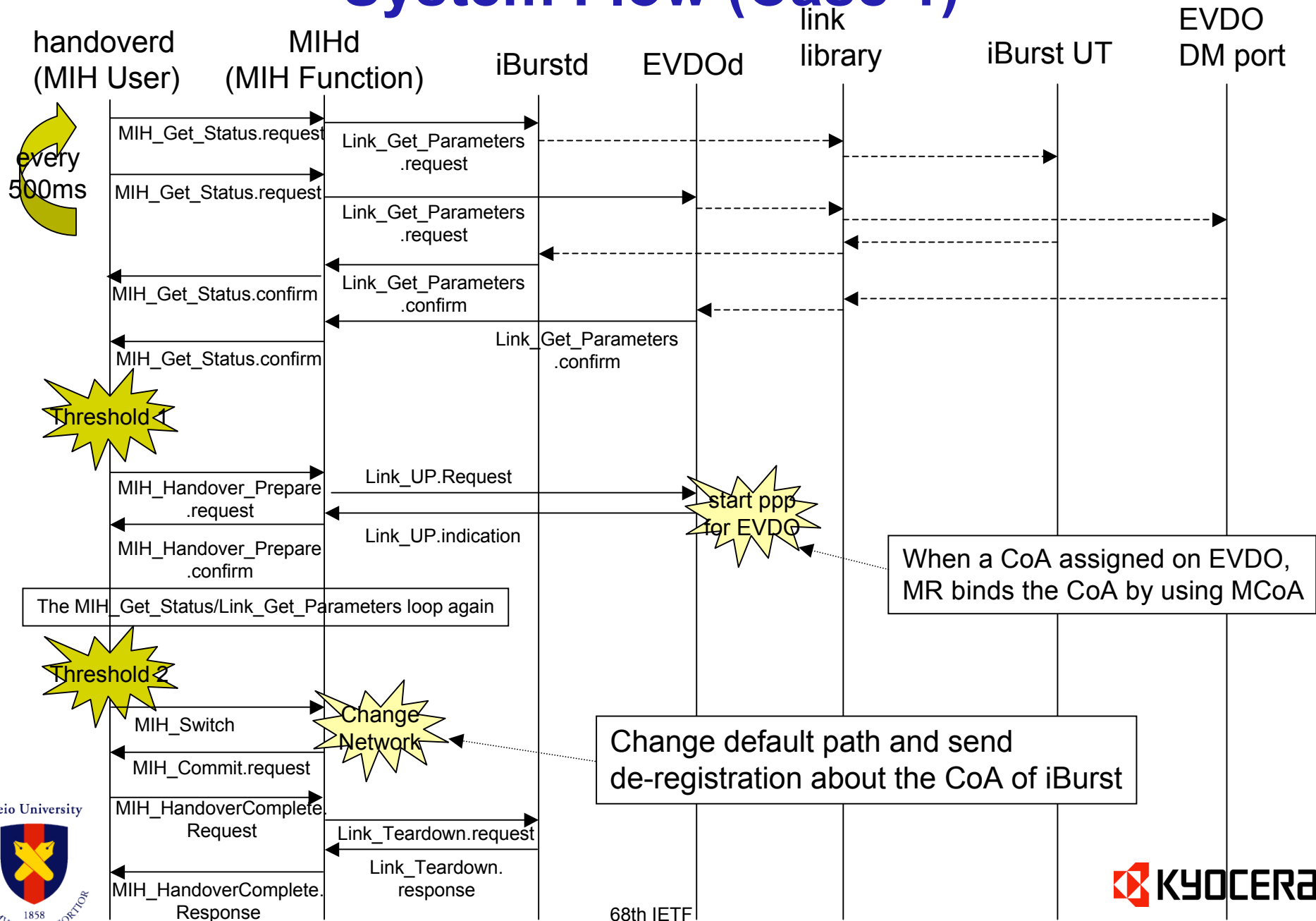
Changes of L2 RSSI (Case 1)

① the RSSI of iBurst goes blow than Threshold 1 (-93dBm).
② the NEMO path via EVDO is established
③ the RSSI of iBurst goes blow than Threshold 2 (-98dBm).

We defined the thresholds according to ITU-T G.107

The VoIP trace on MNN (Case 1)

68th IETF

Comparison with other Scenarios

case	packet loss	delay(ms)
(1) NEMO + MCoA + 2 trigger	0	0
(2) NEMO + 2 trigger	33	350
(3) NEMO + GoingDown trigger	847	16900
(4) NEMO + no L2 interaction	7338	142000

(1) See the previous two slides. **0 packet loss**!
(2) The case without MCoA support. **The delay is caused by RTT of BU/BA.**
(3) The case only with LinkDown event. **The delay is about RTT of BU/BA+ Link Preparation.**
(4) The simple NEMO case: Neither L2 indication nor MCoA.
    The MR didn't aware of the link down before the PPP session timeout.

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Consideration

- System must be flexible to support several handover scenarios
    - Setting L2 association (e.g. PPP, 1x) required certain period. Thus LinkGoingDown is not always useful.
    - Some trigger to kick the L2 association/preparation before LinkGoingDown is necessary.

- A common API to send/receive IEEE802.21 message inside a node would help
- An algorithm against misleading indications is needed

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Summary

- Keio/WIDE and Kyocera have designed and implemented a MR which is capable of

    NEMO + MCoA + 802.21

- The MR performs the make-before-break handover with MCoA and triggers the handover by 802.21

- We confirmed the MR works well with iBurst and CDMA2000 1x EvDo Rev.0
    - VoIP clients are communicating via the MR without any packet loss during the handover

Any Question?

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