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| Title | Requirements to Support Network Layer Mobility | |
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| Re: | MBWA Call for Contributions | |
| Abstract | This document reviewed IP-based network layer mobility protocols discussed in IETF. In particular, Fast-handoff for Mobile IP (FMIP), a protocol to support IP-based cellular communications, is described in details. These protocols require lower layers' support, such as layer two triggers, to work perfectly. This document indicated requirements for lower layers in order to support network layer mobility management. | |
| Purpose | This document is provided as network requirements for 802.20 standards. | |
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Requirements to Support Network Layer Mobility

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Overview

- Handover events necessitate both link-layer and network-layer actions
- Network-layer needs information from link-layer to better respond to handovers
 - Need to establish IP connectivity as fast as possible
- IP needs standards-based interface with the lower layers, e.g., IEEE 802 links

Mobile IP Handovers

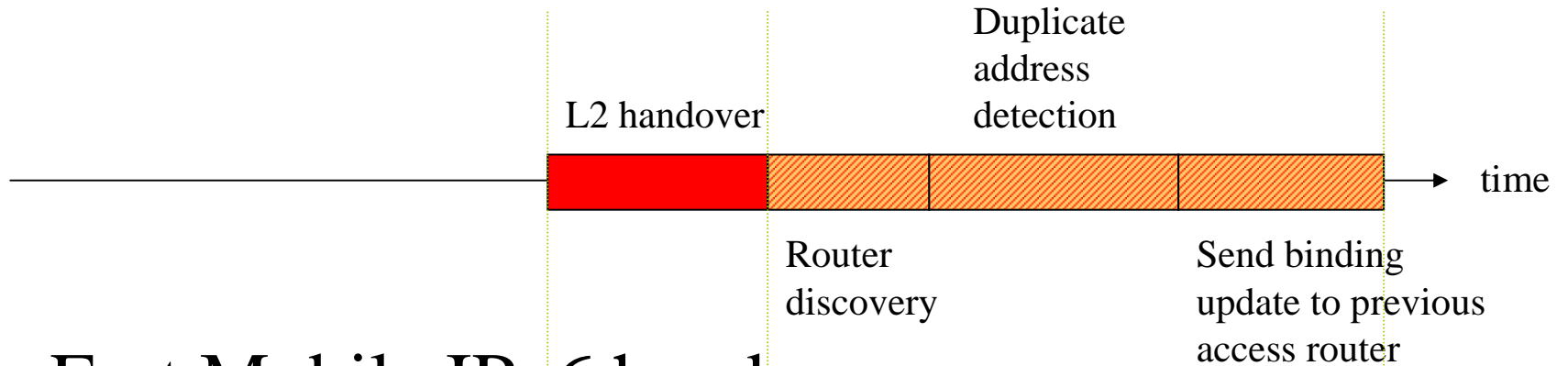
- Slow, because:
 - IP stack has to detect the movement by listening to router advertisements
 - Configure a new IP address (DHCP or IPv6 address auto-configuration)
 - Send binding update to home agent
- Doing these after the handover creates considerable delays for IP-layer connectivity

Fast Handovers for Mobile IPv6

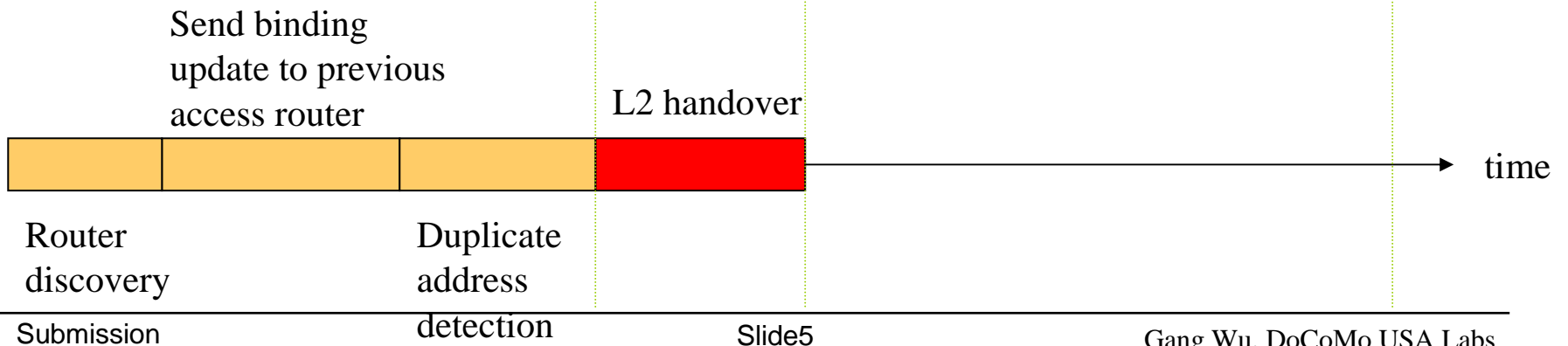
- Basic idea:
 - Anticipate movement with the help of link-layer
 - Prepare network and host in advance
 - After L2 movement, L3 is ready to serve
 - Done!
- IETF Mobile IP WG work item:
 - draft-ietf-mobileip-fast-mipv6-06

Slow vs. Fast!

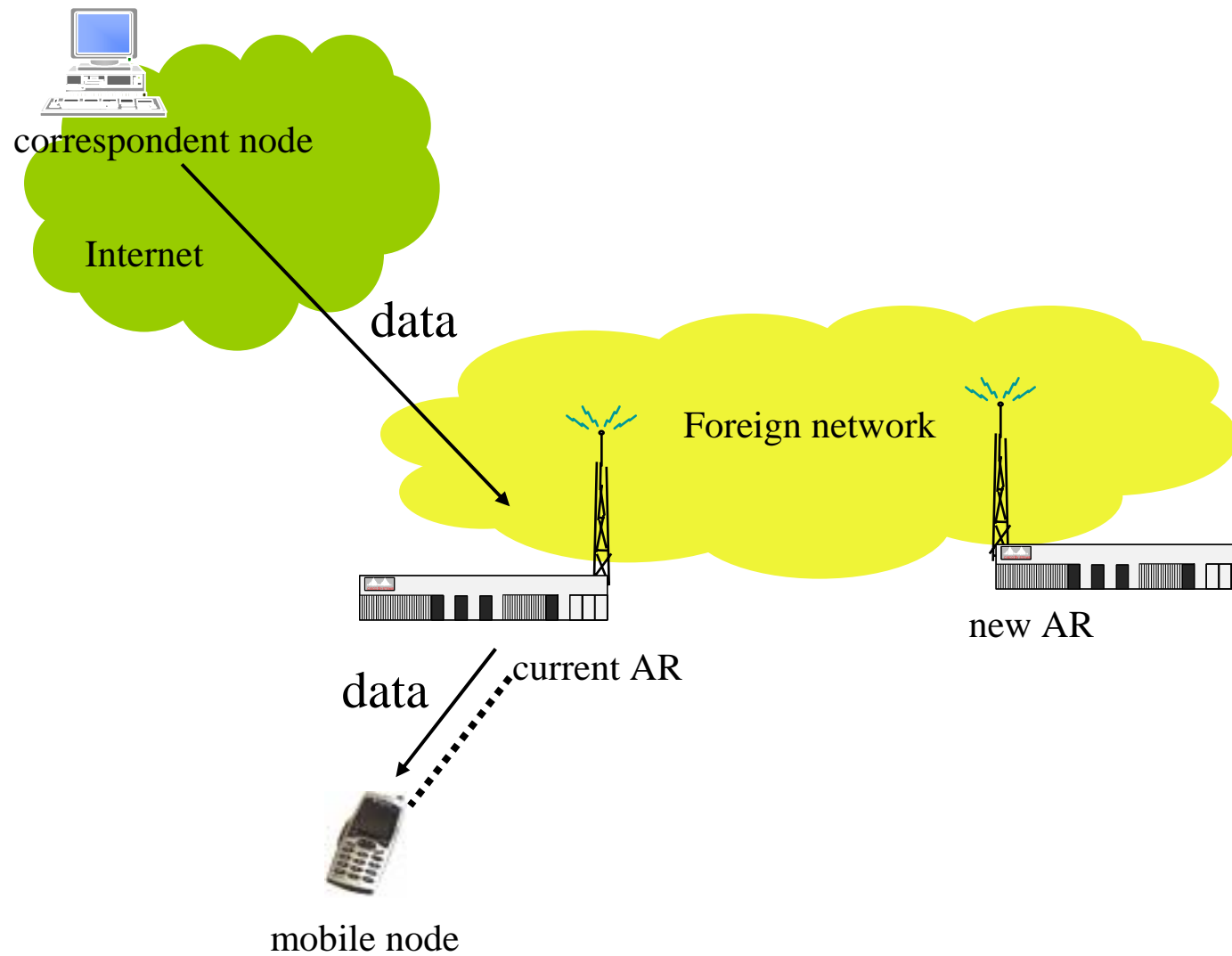
- Standard Mobile IPv6 handover:



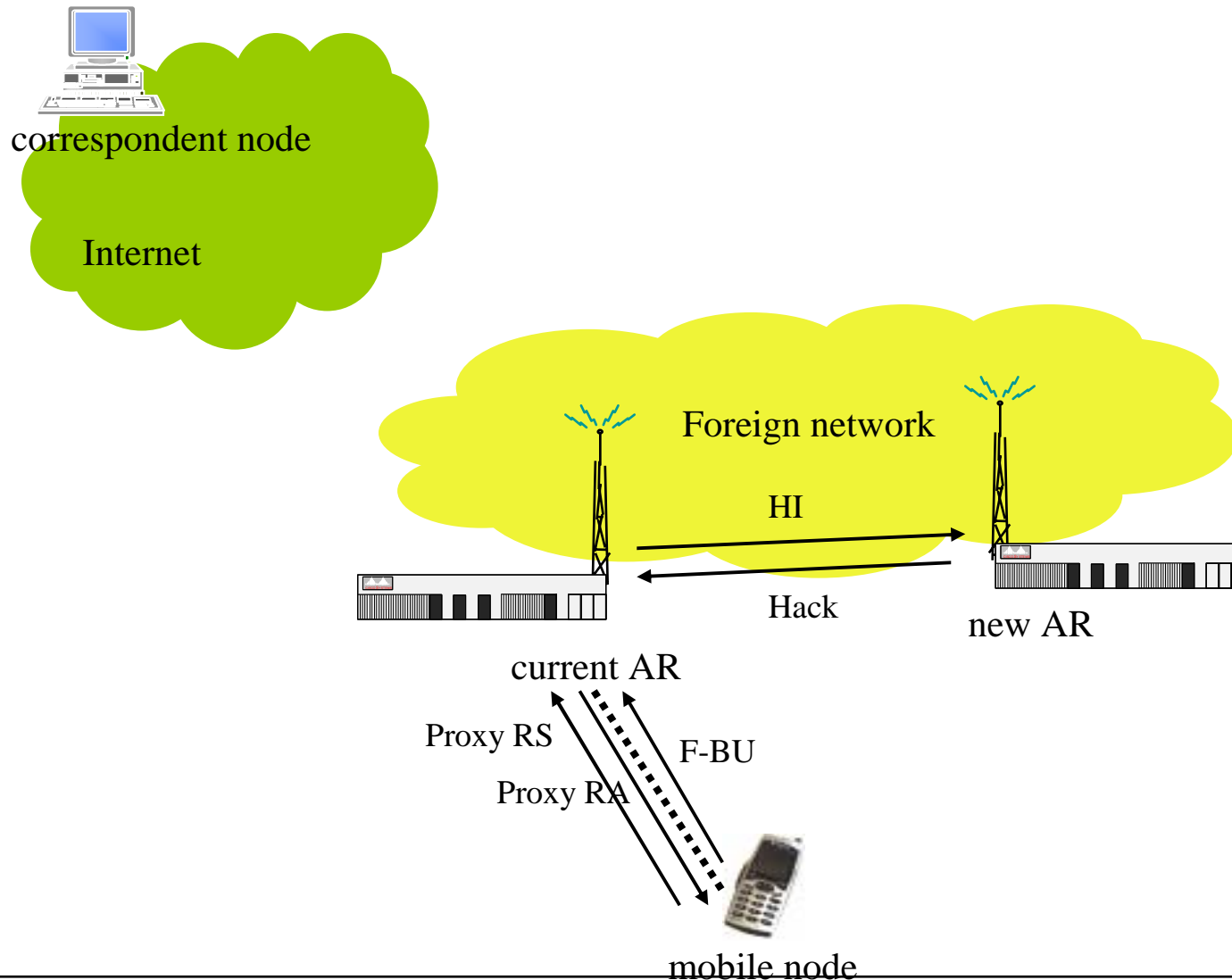
- Fast Mobile IPv6 handover:



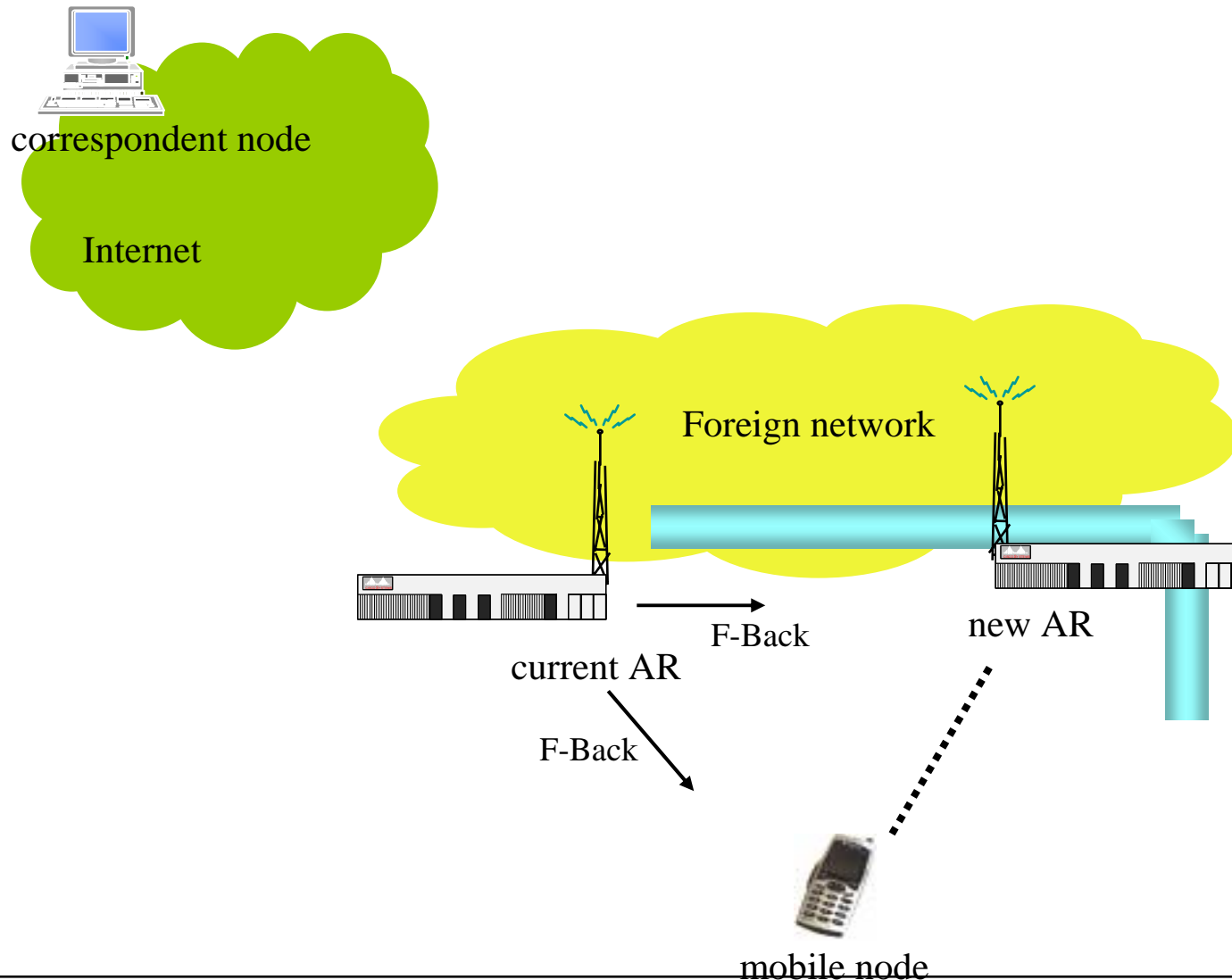
IP Signaling



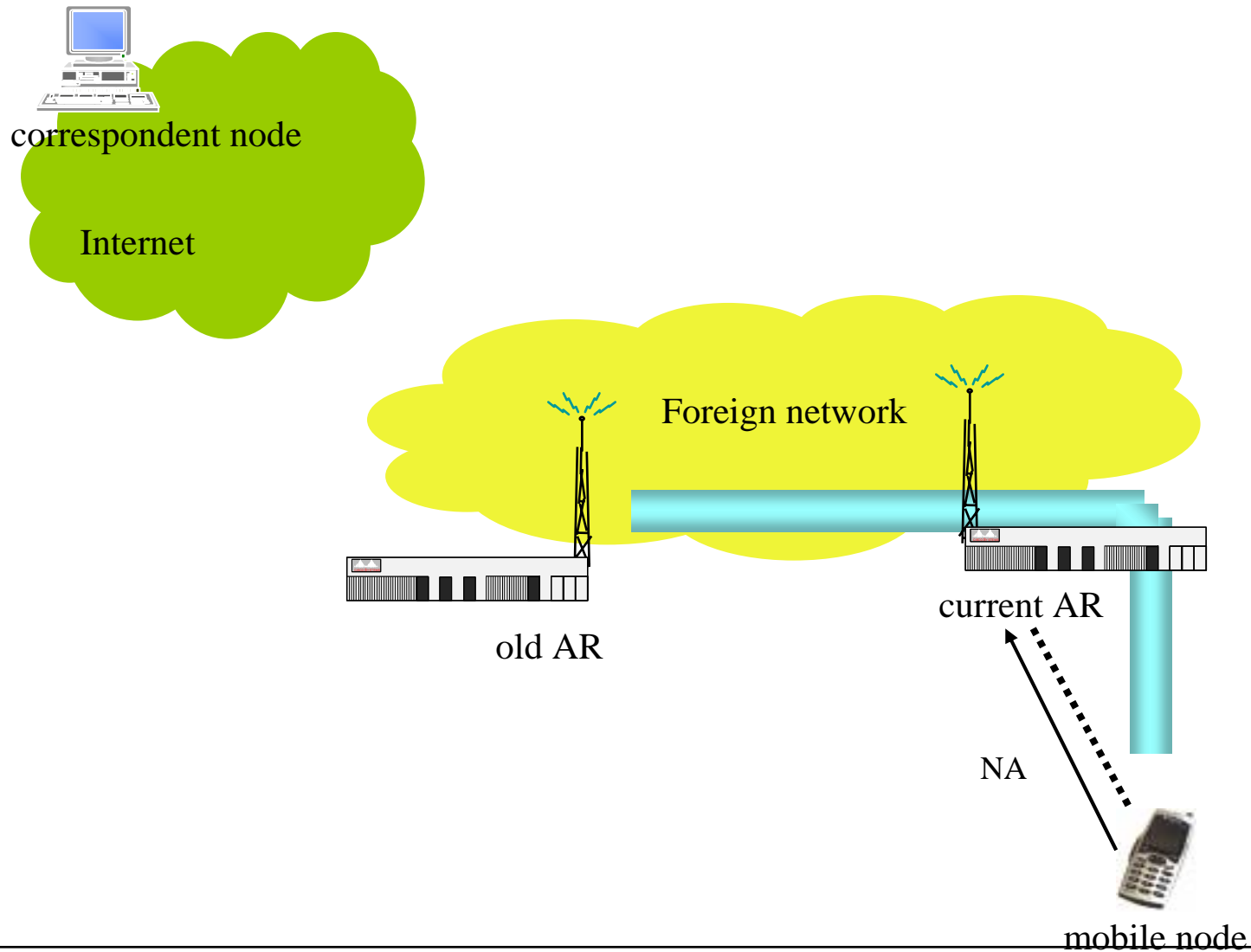
IP Signaling



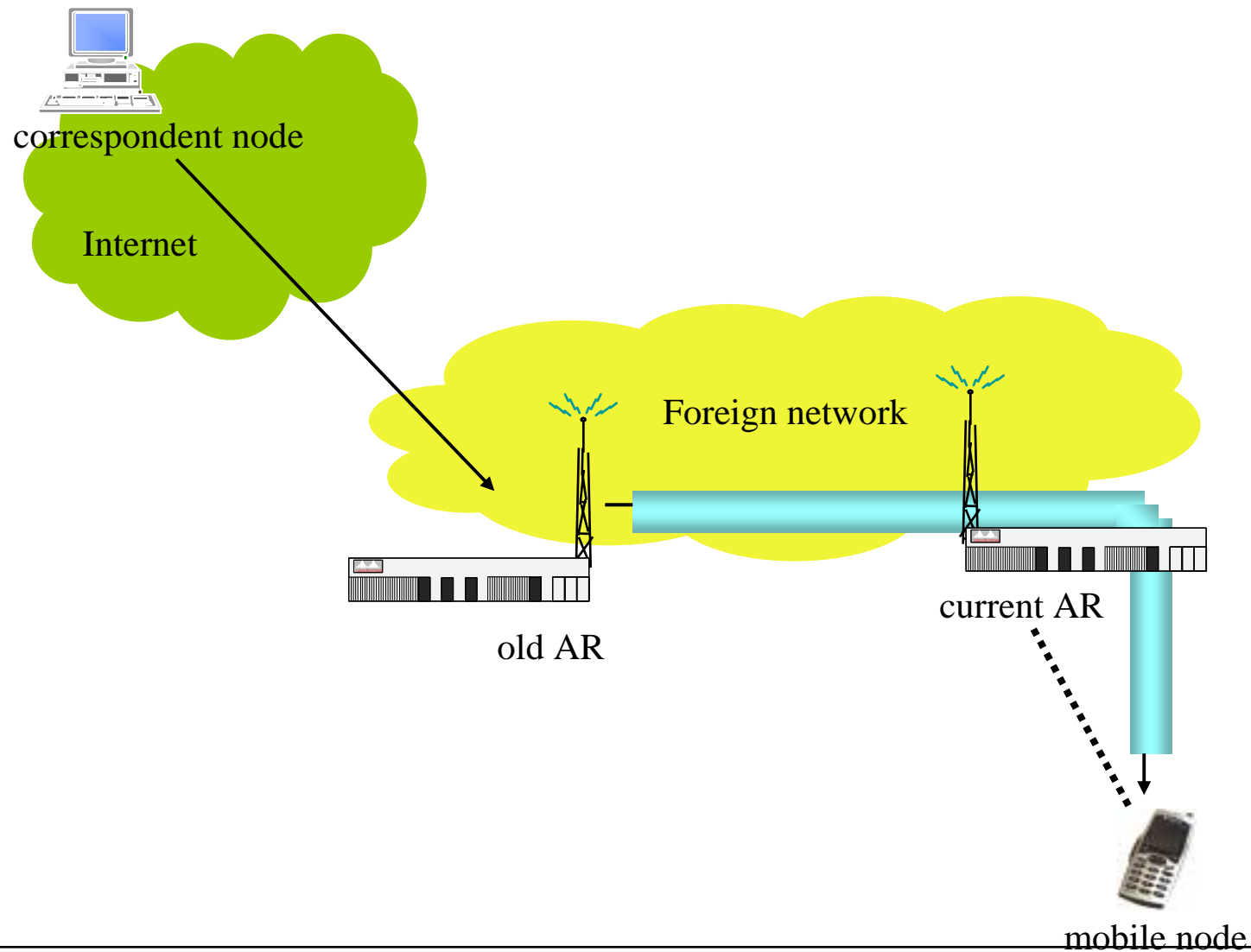
IP Signaling



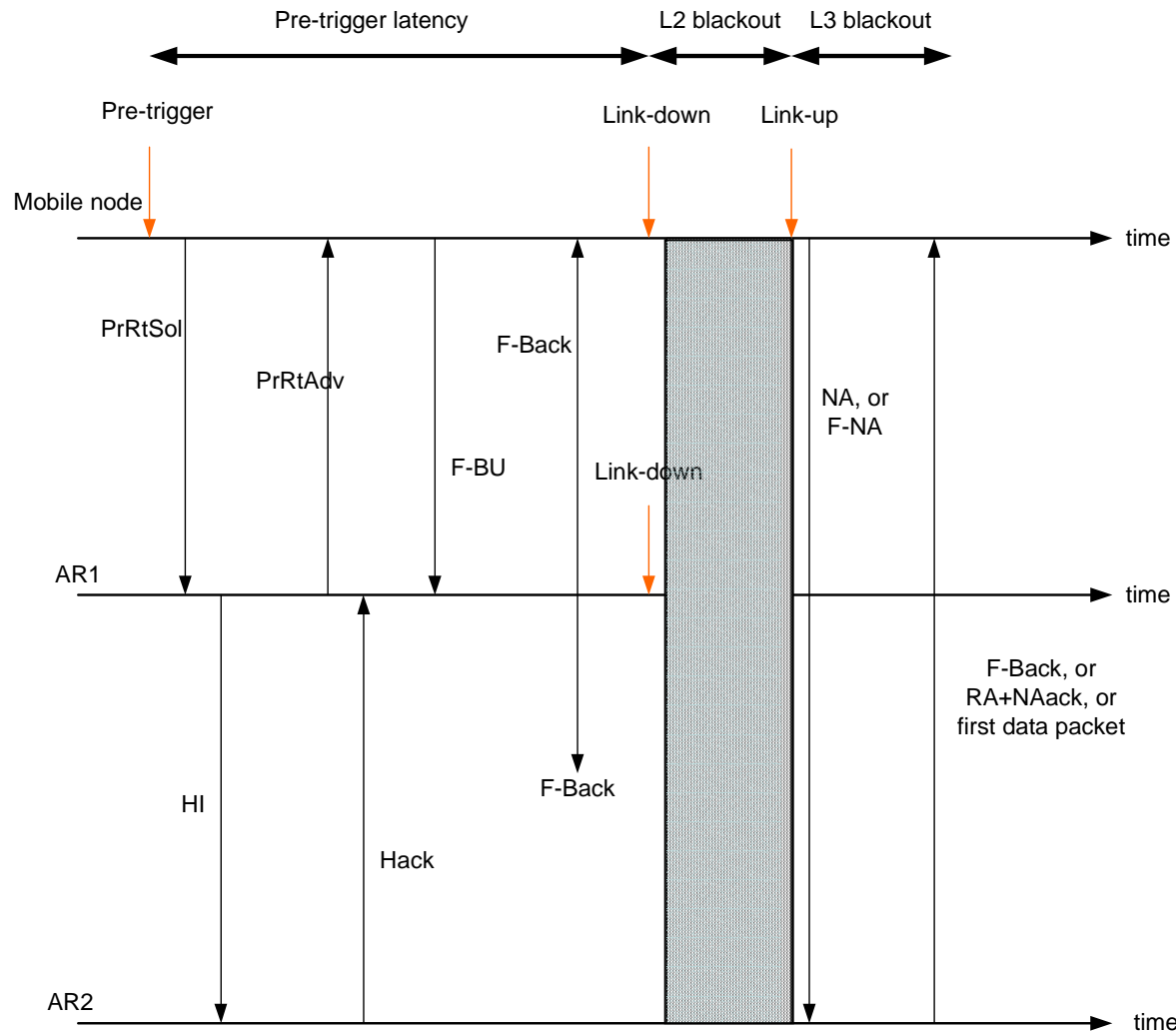
IP Signaling



IP Signaling



Protocol Events

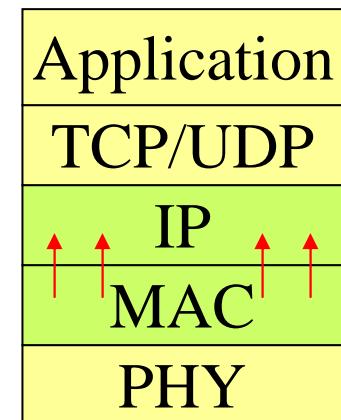


FMIP Needs...

- FMIP needs link-layer to provide some indications that handover is imminent or (at least) it has just happened

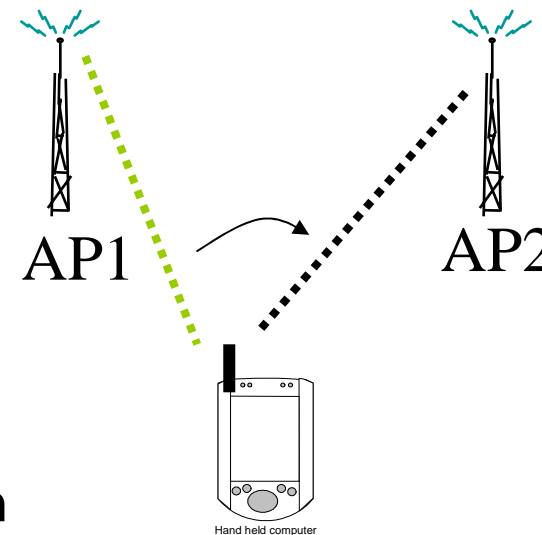
Link-layer Triggers

- An abstraction of a notification from link-layer (potentially including parameter information) that a certain event has happened or is about to happen
- IETF draft:
 - draft-manyfolks-l2-mobilereq-01



Link-layer Triggers

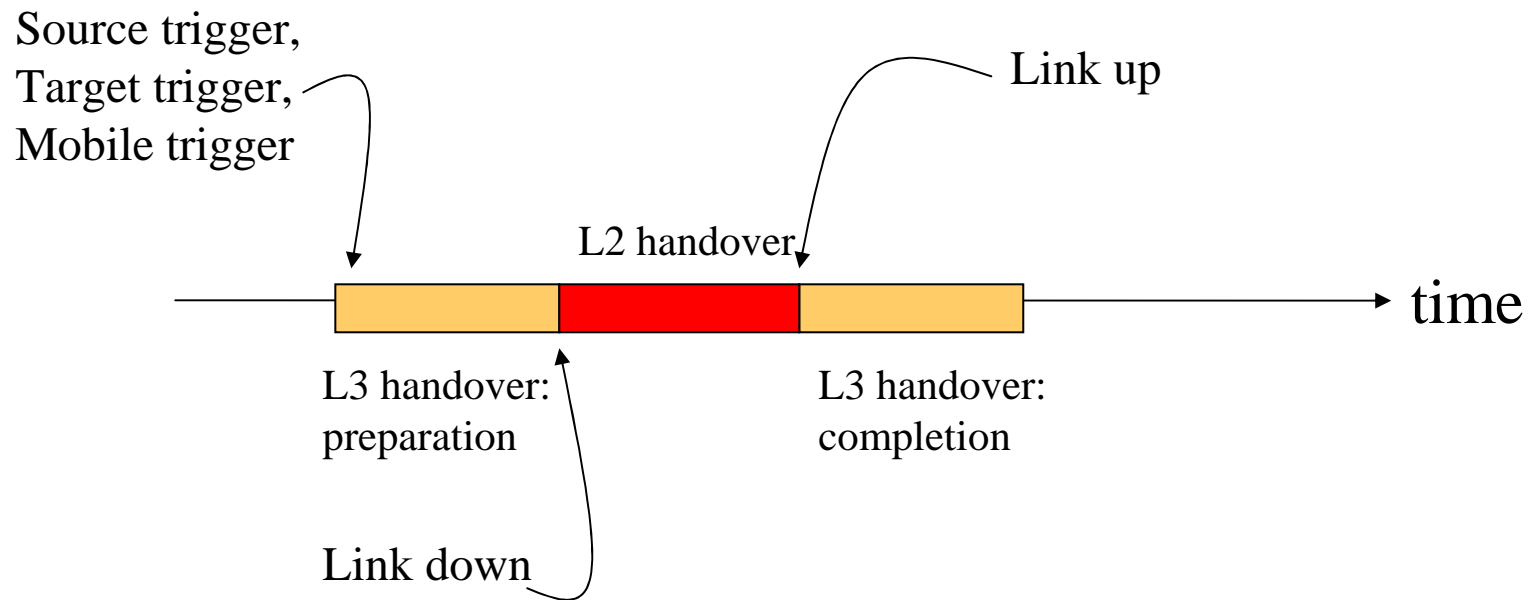
- Link Up
 - Link Down
 - Source Trigger
 - Target Trigger
 - Mobile Trigger
-
- First, AP1 receives source trigger, AP2 receives target trigger, mobile receives mobile trigger
 - Then, AP1 and client receive link down
 - Finally, AP2 and client receive link up
-
- Not all link-layer technologies can produce all of these triggers
 - Not all IP-layer mechanisms need all of these triggers



Use of Link-layer Triggers

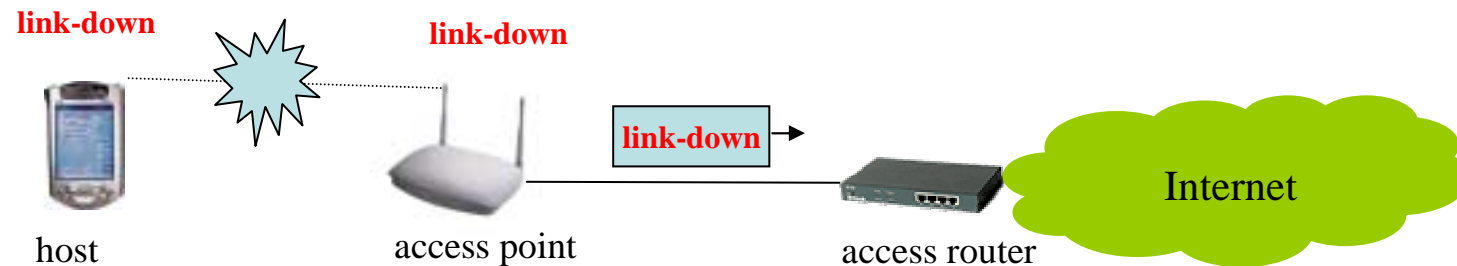
- IP handovers
 - Mobile IP, FMIPv4, FMIPv6 rely on the existence of a subset of triggers
 - High performance, efficient mobility management
 - Clean-up state
 - Access router can flush ARP and ND cache entries when the host detaches from the link
 - Faster router discovery
 - Access router can send unsolicited router advertisements as soon as it detects the new host
- Context transfers
 - Access router can take context transfer actions upon detecting handovers

Link-layer Triggers and Handover



Link-layer Triggers Protocol

- When the link-layer access device is not co-located with the access router, a protocol is needed to carry event notifications



- IETF draft:
 - draft-yegin-l2-triggers-00.txt

Recommendation to IEEE

- Formal definition of IEEE 802 link-layer events for IP-layer's consumption
- Definition of an API for IP to obtain relevant triggers
- Support standardization of Link-layer Triggers Protocol at IETF (or, alternatively, make it an IEEE-only standard)
- so that IP operates better on IEEE 802 links