



L3 Driven Fast Handover Using L2 Triggers in Mobile Internet

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Research Activities in Teraoka Lab.

– Internet & Distributed Systems –

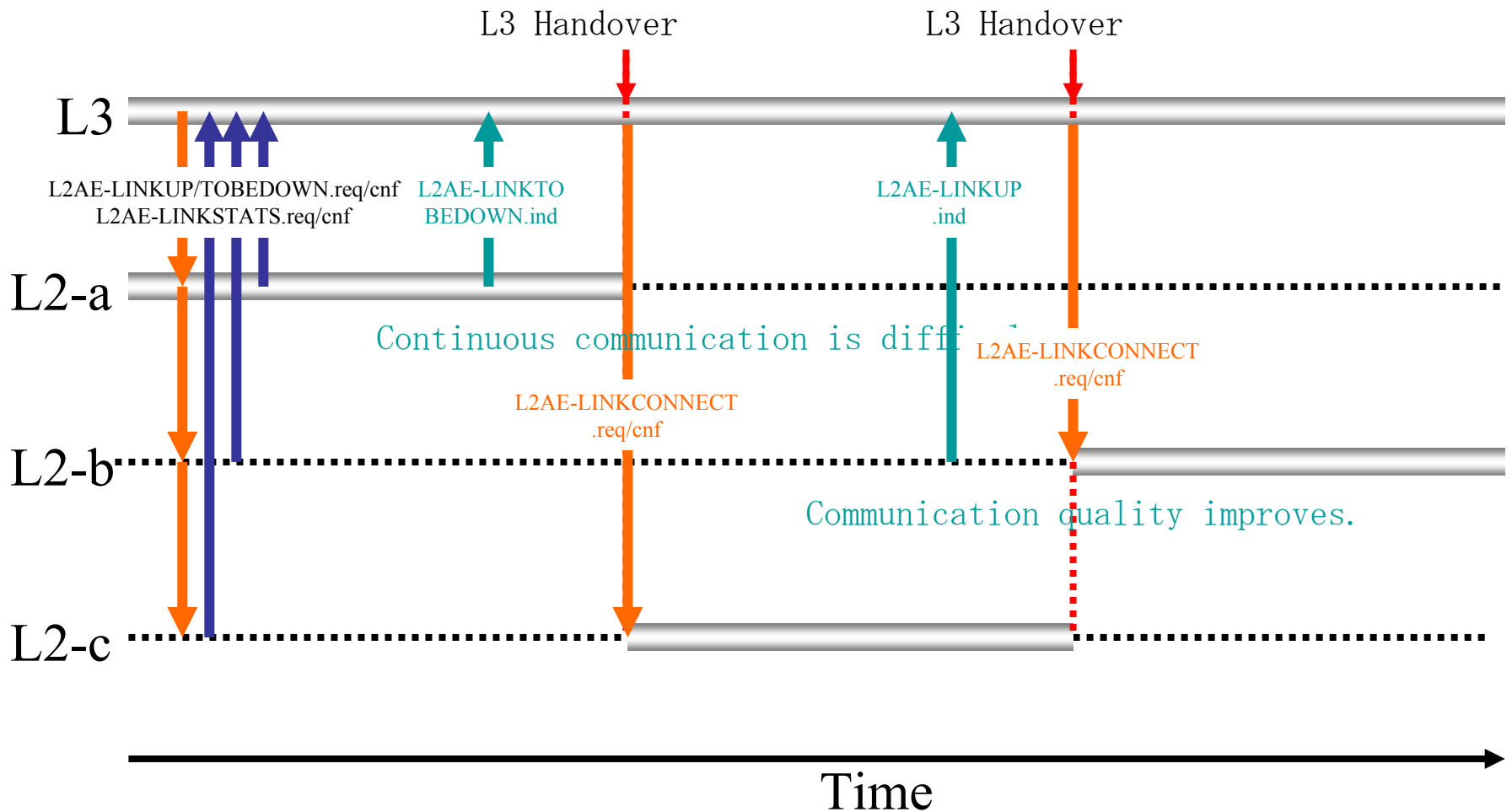
- Peer-to-Peer Network
 - efficient VoD data delivery
 - bootstrap mechanism
- GLI: Location Info. Management System
 - scalability & privacy
- Security
 - Quarantine Model to protect intranet
 - AAA mechanism for Internet mobility
 - anonymous mobile comm.
- Transport Protocols
 - TCP-J
 - efficient multi-link support in TCP
- Mobility & Multihoming
 - mobile node support: LIN6
 - mobile network support: LIN6-NEMO
 - multihoming support
- L2 Triggering
 - LIES: control info. exchange system
 - seamless handovers



Outline / Summary

- **Goal of L3 driven fast handover**
- Architecture for control information exchange
 - general protocol layering model
 - Internet layering model
- L2 primitives for L3 driven fast handover
- LIES: implementation of control information exchange on NetBSD
- Wireless Environment Emulator for handover test

L3 Driven Handover: Vertical Handover

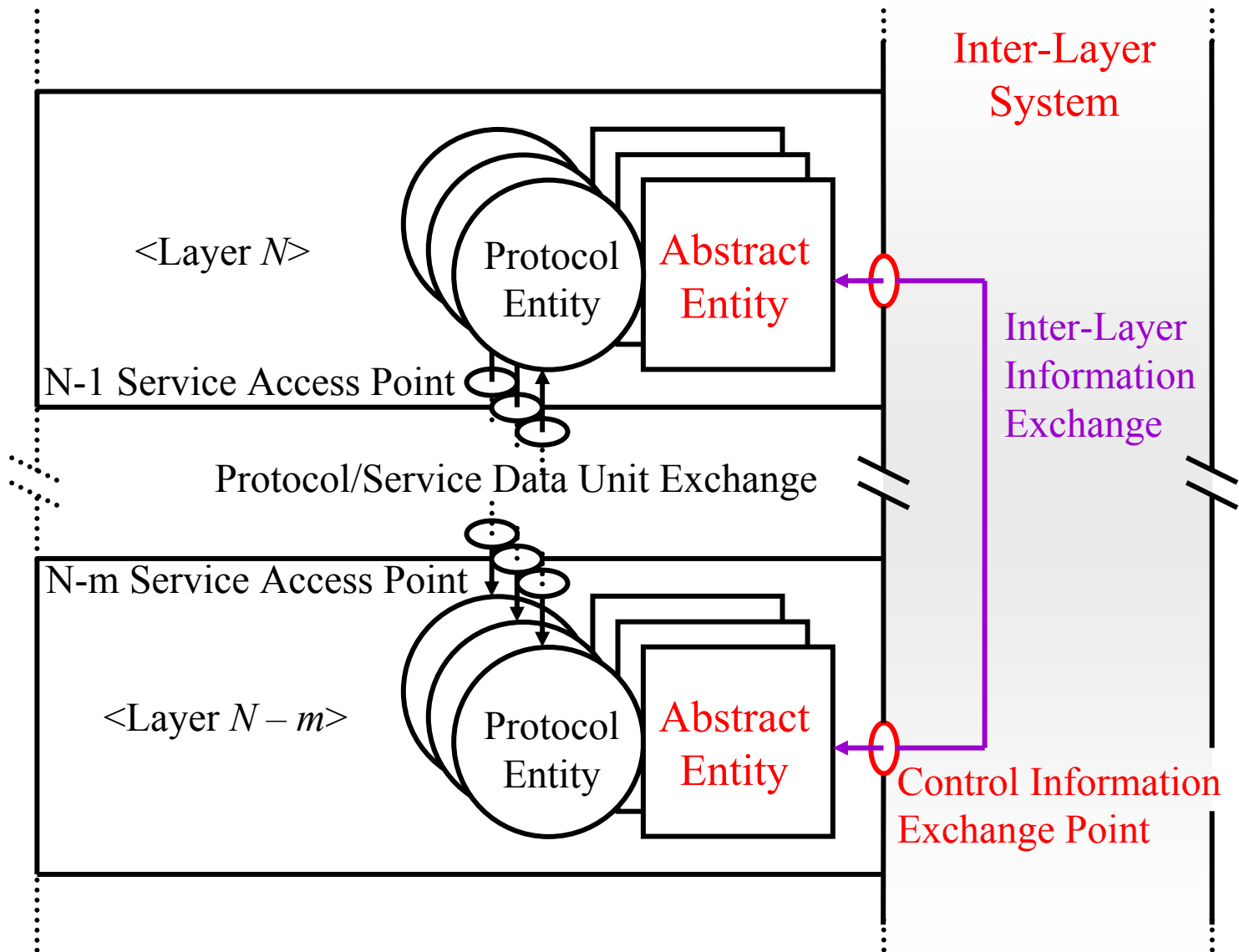




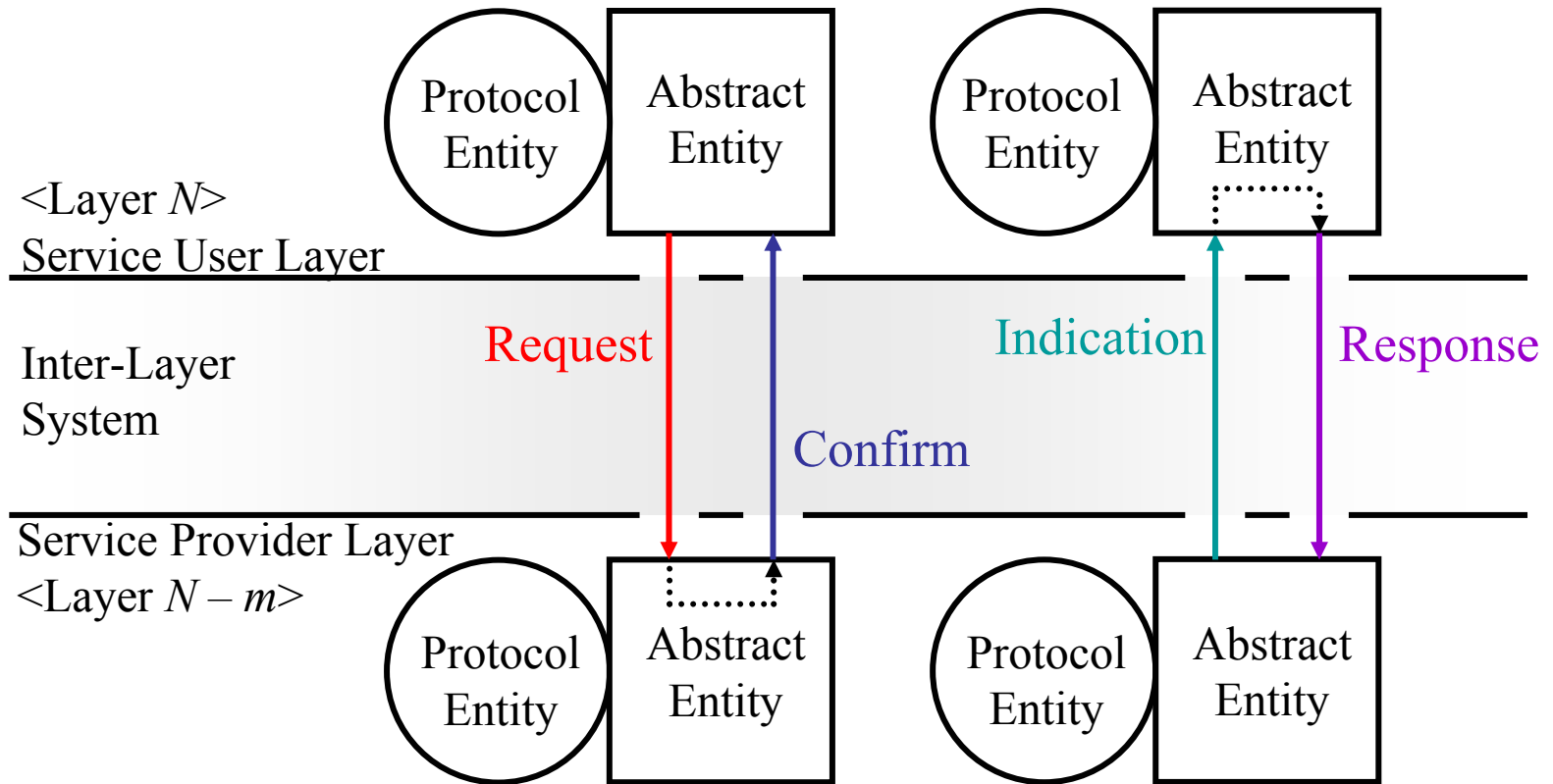
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Protocol Layering Architecture for Control Information Exchange

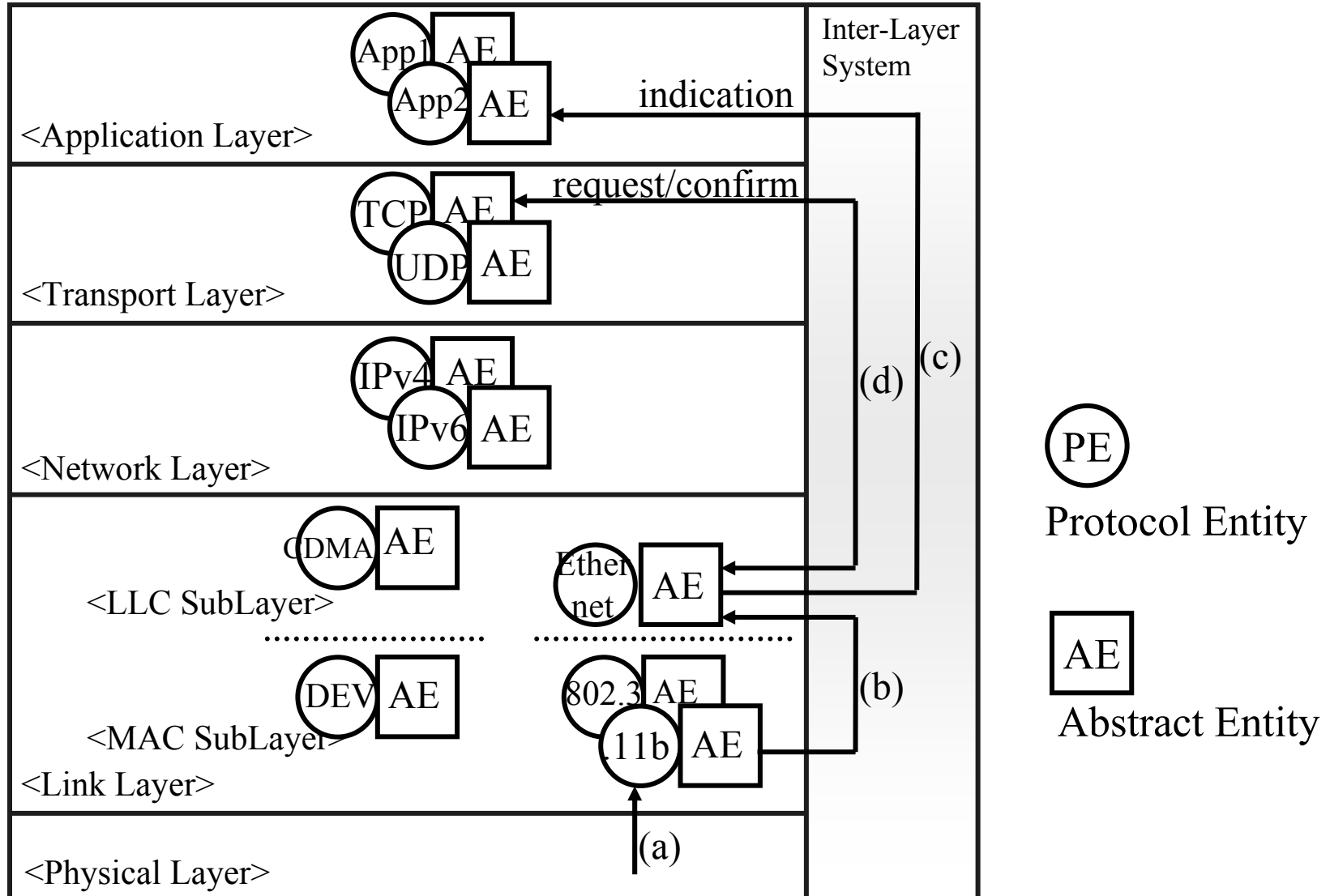


Primitives for Control Information Exchange



- **Request** → **Confirm**
- **Indication** → **Response**

Internet Layering Architecture for Control Information Exchange





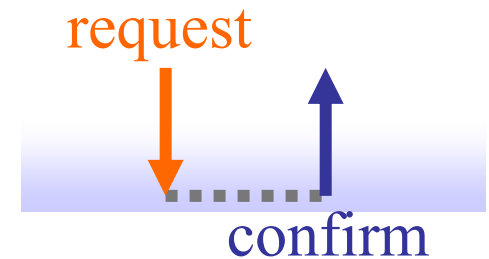
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L2 Primitives: Candidate Access Points

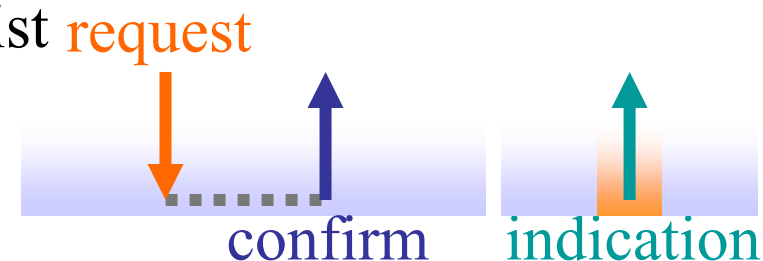
L2AE-PEERLIST

- Acquisition request for the list of possible peers.
 - request: i/f id, i/f type
 - confirm: i/f id, i/f type, PEER-List



L2AE-PEERFOUND / L2AE-PEERLOST

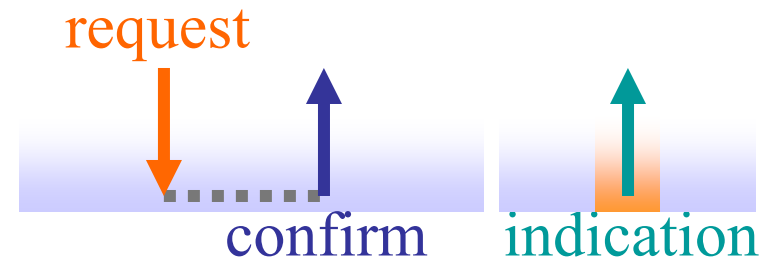
- Indication of discovery/missing of candidate peers.
 - request: i/f id, i/f type, condition, enable/disable
 - confirm: i/f id, i/f type, Ack/Error
 - indication: i/f id, i/f type, PEER-List



L2 Primitives: Link Up/Down

■ L2AE-LINKUP / L2AE-LINKDOWN

- Notification that a new link is brought up / an existing link is brought down.
 - request: i/f id, i/f type, enable/disable
 - confirm: i/f id, i/f type, Ack/Error
 - indication: i/f id, i/f type, PEER



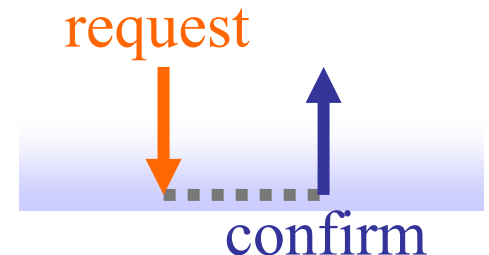
■ L2AE-LINKTOBEDOWN

- Notification that the existing link is bringing down.
 - request: i/f id, i/f type, condition, enable/disable
 - confirm: i/f id, i/f type, Ack/Error
 - indication: i/f id, i/f type, condition, PEER

L2 Primitives: Link Status

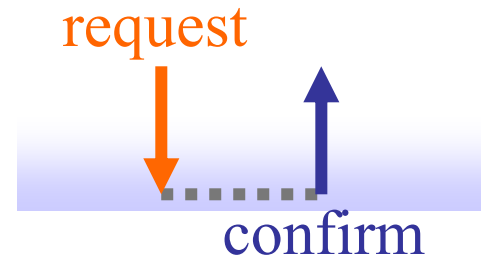
■ L2AE-LINKSTATUS

- Acquisition request for the current link status.
 - request: i/f id, i/f type
 - confirm: i/f id, i/f type, i/f type options, i/f data rate, security, condition, PEER



L2 Primitives: Connect/Disconnect

- L2AE-LINKCONNECT / L2AE-LINKDISCONNECT
 - Request for connection/disconnection of the specific link.
 - request: i/f id, i/f type, PEER
 - confirm: i/f id, i/f type, Ack/Error





Mapping of Primitives and IEEE802.11

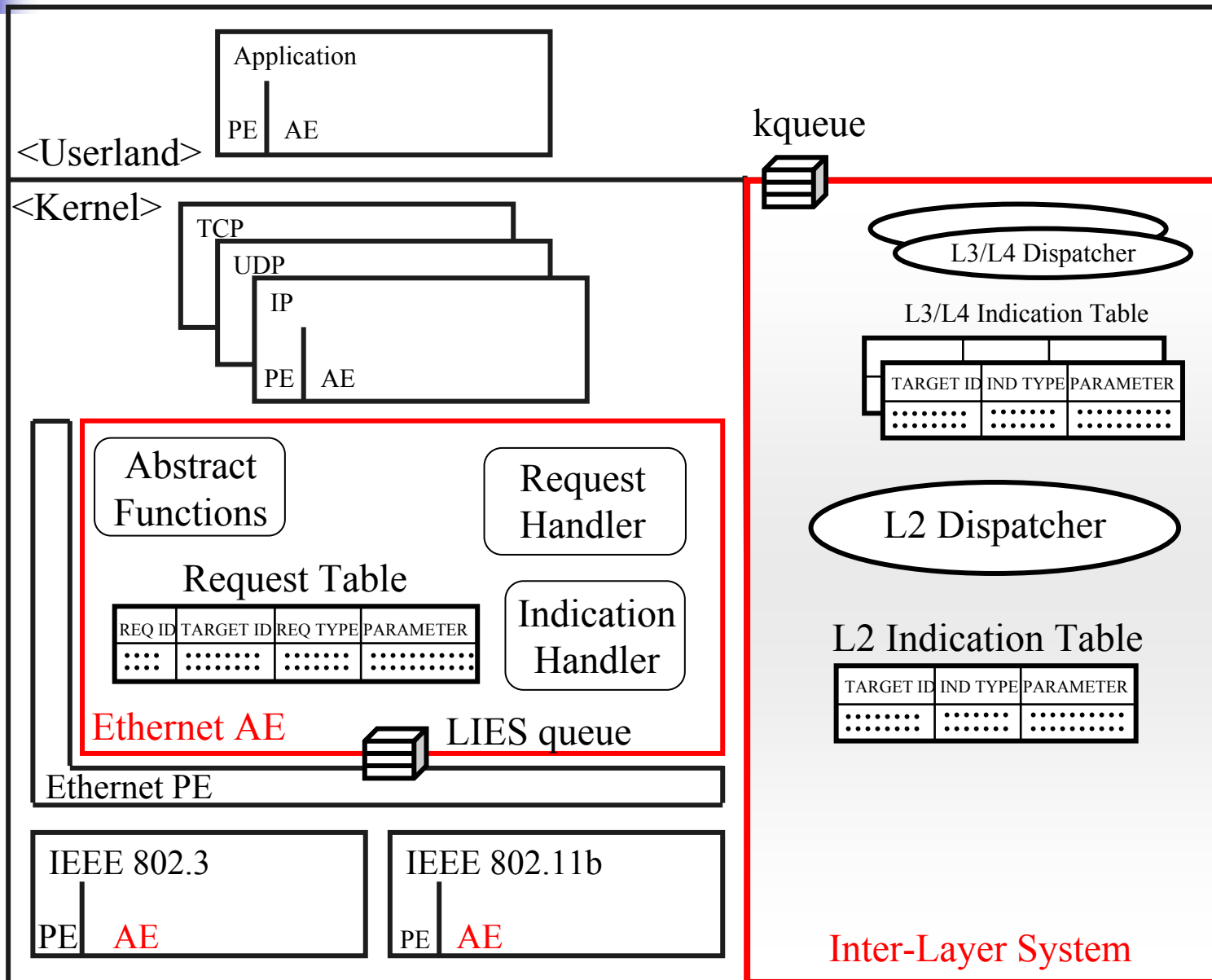
| Primitive | Request | Confirm | Indication | Response |
|----------------|--|--|--|----------|
| PEERLIST | MLME-SCAN.req | MLME-SCAN.cnf | | |
| PEERFOUND | register | confirm | MLME-SCAN.cnf | |
| PEERLOST | register | confirm | MLME-SCAN.cnf | |
| LINKUP | register | confirm | MLME-ASSOCIATE.ind MLME-REASSOCIATE.ind | |
| LINKDOWN | register | confirm | MLME-DISASSOCIATE.ind (PMD_RSSI.ind) | |
| LINKTOBEDOWN | register | confirm | PMD_RSSI.ind | |
| STATUS | request | PMD_RSSI.ind MLME-ASSOCIATE.ind MLME-REASSOCIATE.ind MLME-DISASSOCIATE.ind | | |
| LINKCONNECT | MLME-JOIN.req MLME-AUTHENTICATE.req MLME-ASSOCIATE.req MLME-REASSOCIATE.req | MLME-JOIN.cnf MLME-AUTHENTICATE.cnf MLME-ASSOCIATE.cnf MLME-REASSOCIATE.cnf | | |
| LINKDISCONNECT | MLME-DISASSOCIATE.req | MLME-DISASSOCIATE.cnf | | |



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LIES: Implementation of Control Information Exchange System on NetBSD



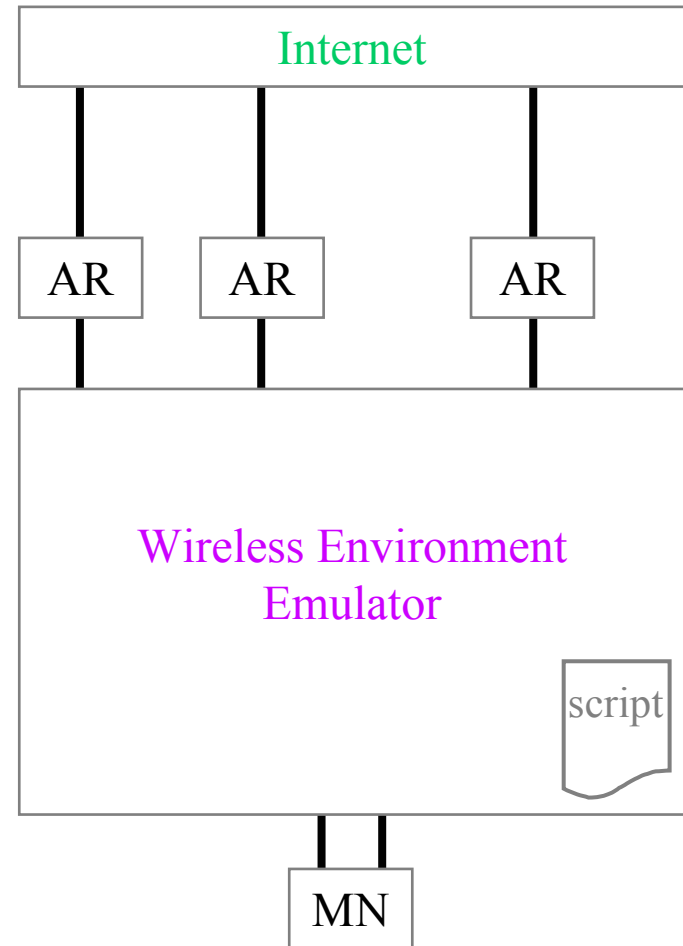
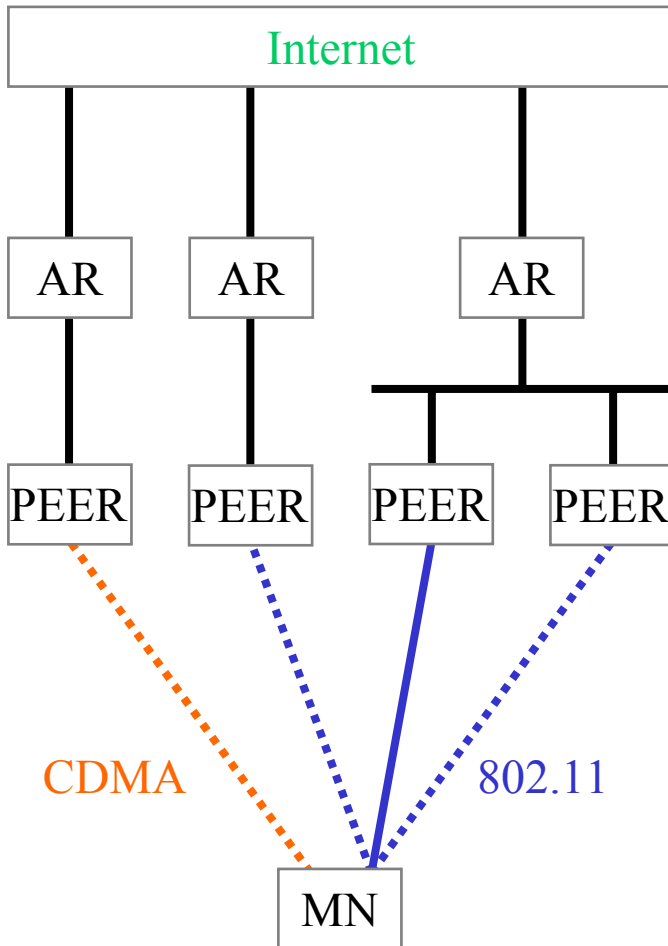


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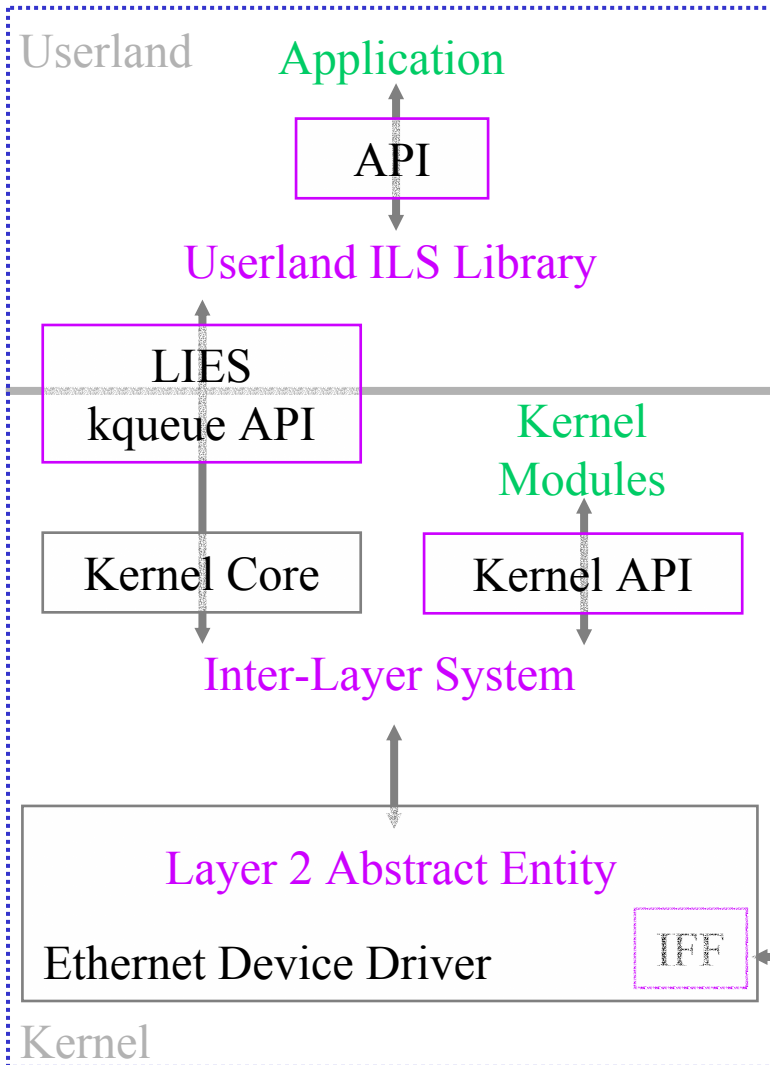
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Wireless Environment Emulator

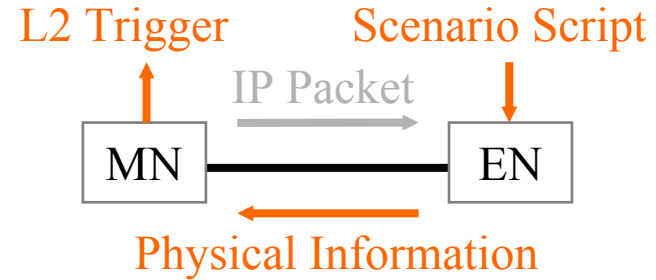
- L2 Event Generator (Script Executer & PHY Information Generator)
- Wireless Link Emulator (L2 Bridge)



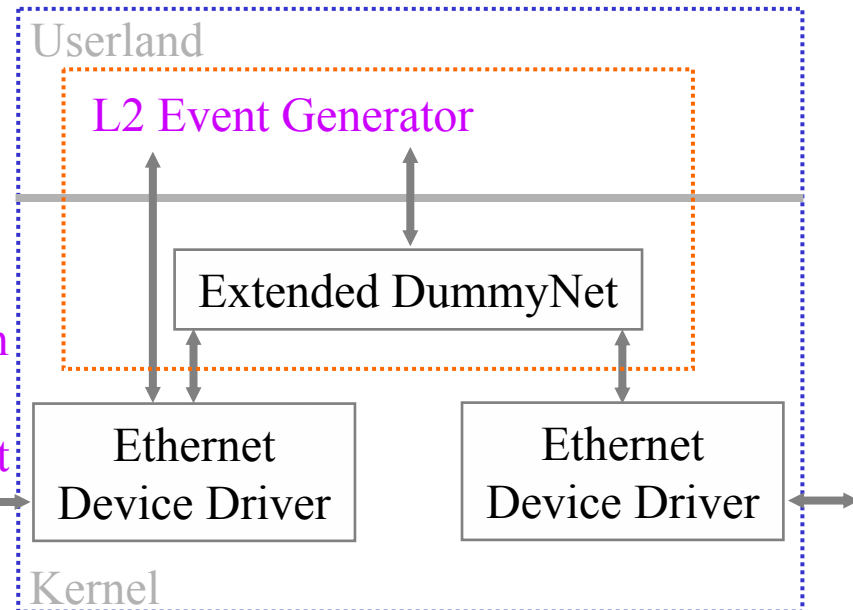
Design of Wireless Environment Emulator Implementation



Mobile Node



IFF: InterFace Faker
 ILS: Inter-Layer System



Emulator Node

Physical Information and Data Packet



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