- **IEEE 802.21 MEDIA INDEPENDENT HANDOVER**

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- Title: **Proposed IEEE 802.21 Presentation for 3GPP**

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- Authors or Source(s):

  3GPP Liaison Package Development Ad hoc Group (work in progress)

- Abstract:

  Provide 3GPP community with a high lever description of the - IEEE 802.21 specification

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Motivation
(some 3GPP mobility requirements)

- "An AIPN mobility solution must support UTRAN and GERAN bases systems as possible access systems beside supporting alternative existing accesses such as WLAN" (3GPP 22.978, v7.1.0, ch 5.2.1.4)
- "An AIPN mobility solution should support seamless terminal mobility across various access systems" (3GPP 22.978, v7.1.0, ch. 5.2.1.4)
- "It shall provide voice call continuity when the user is moving between GSM/UMTS CS domain and IMS" (3GPP 23.806 , v1.3.0, ch 5.2)
- "The UE shall be able to detect and automatically connect to the available access Network" (3GPP 23.806, , v1.3.0, ch 5.2)

What is IEEE 802.21?

- IEEE 802.21 is being developed to facilitate smooth interaction and media independent handover between 802 technologies and other access technologies
- IEEE 802.21 Membership spans over 70 members from more that 20 companies in over 10 Countries
- IEEE 802.21 offers an open interface that:
  - ✓ provides link state event reporting in real time (Event Service)
  - ✓ provides intersystem information, automatically and on demand (Information Service)
  - ✓ allows a user to control handover link state (Command Service)

Why are we here?

- Work actively within relevant standard bodies in order to introduce applicable IEEE 802.21 requirements (E.g., where does IEEE 802.21 fit?)
- Update relevant 3GPP groups with latest development in IEEE 802.21 standards
- Request your feed back and support in the determination of the optimal placement of IEEE 802.21 Functions.
- Enthuse the 3GPP community about the development of requirement on IEEE 802.21 technology. (E.g., Does IEEE 802.21 fit inside an existing or new 3GPP WI?)

Some IEEE 802.21 Definitions

- **Media Independent Handover Function (MIHF):** MIH is a cross-layer entity that provides mobility support through well defined Service Access Points offering Event, Information and Command services
- **MIH User:** A local entity that avails of MIHF services through the MIH Service Access Points
- **MIH Network Entity:** A remote entity that is able to communicate with an MIHF over a transport that supports Media Independent Services
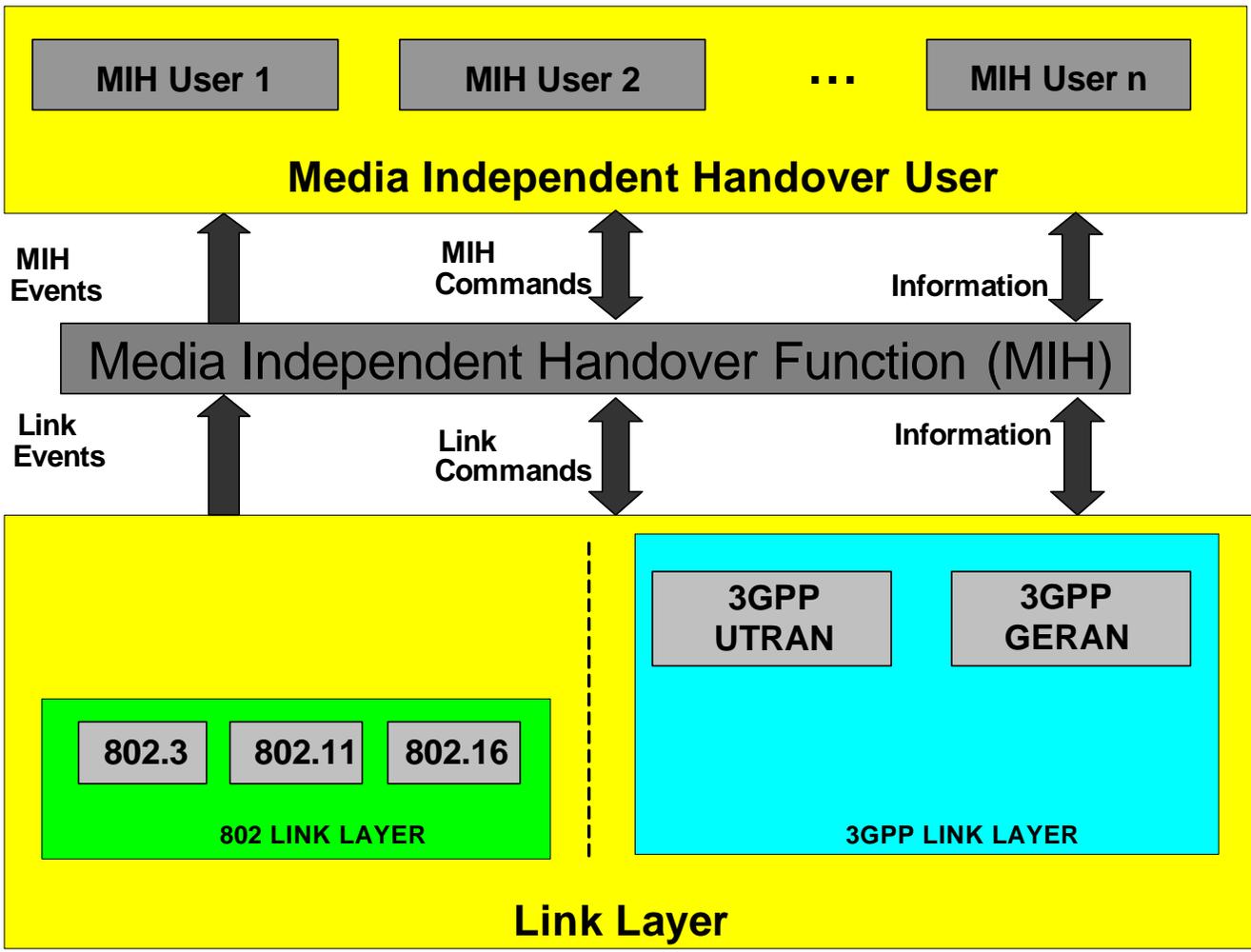
IEEE 802.21 Dos and Don'ts

IEEE 802.21

- **specifies** procedures that **facilitate** handover decision making, providing link layer state information to MIH users. Enabling **low latency handovers across multi-technology access networks**
- **defines** the methods and semantics that **facilitate** the acquisition of heterogeneous network information and the basic content of the this information, thereby enabling **network availability detection**
- **specifies** command procedures that **facilitate** seamless service continuity across heterogeneous networks

IEEE 802.21

- IEEE 802.21 neither executes handovers nor defines handover policies leading to handover execution
- IEEE 802.21 neither controls network detection nor specifies network selection procedures

IEEE 802.21 Model Terminal Side

MIH User 1   **MIH User 2**   ...   **MIH User n**

Media Independent Handover User

MIH Events   **MIH Commands**   **Information**

Media Independent Handover Function (MIH)

Link Events   **Link Commands**   **Information**

3GPP UTRAN   **3GPP GERAN**

802.3 **802.11** **802.16**

802 LINK LAYER

3GPP LINK LAYER

Link Layer

IEEE802.21 Model Network Side

MIH Network Entity

- 802.11 MIH Network Entity
- 802.16 MIH Network Entity
- ...
- 3GPP MIH Network Entity

MIH Events

MIH Commands

Information

Media Independent Handover Function

?

Higher Layer/L2 Transport

Higher Layer Transport

Link Events

Link Commands

Information

802.3   802.11   802.16

802 Access Network

3GPP Network
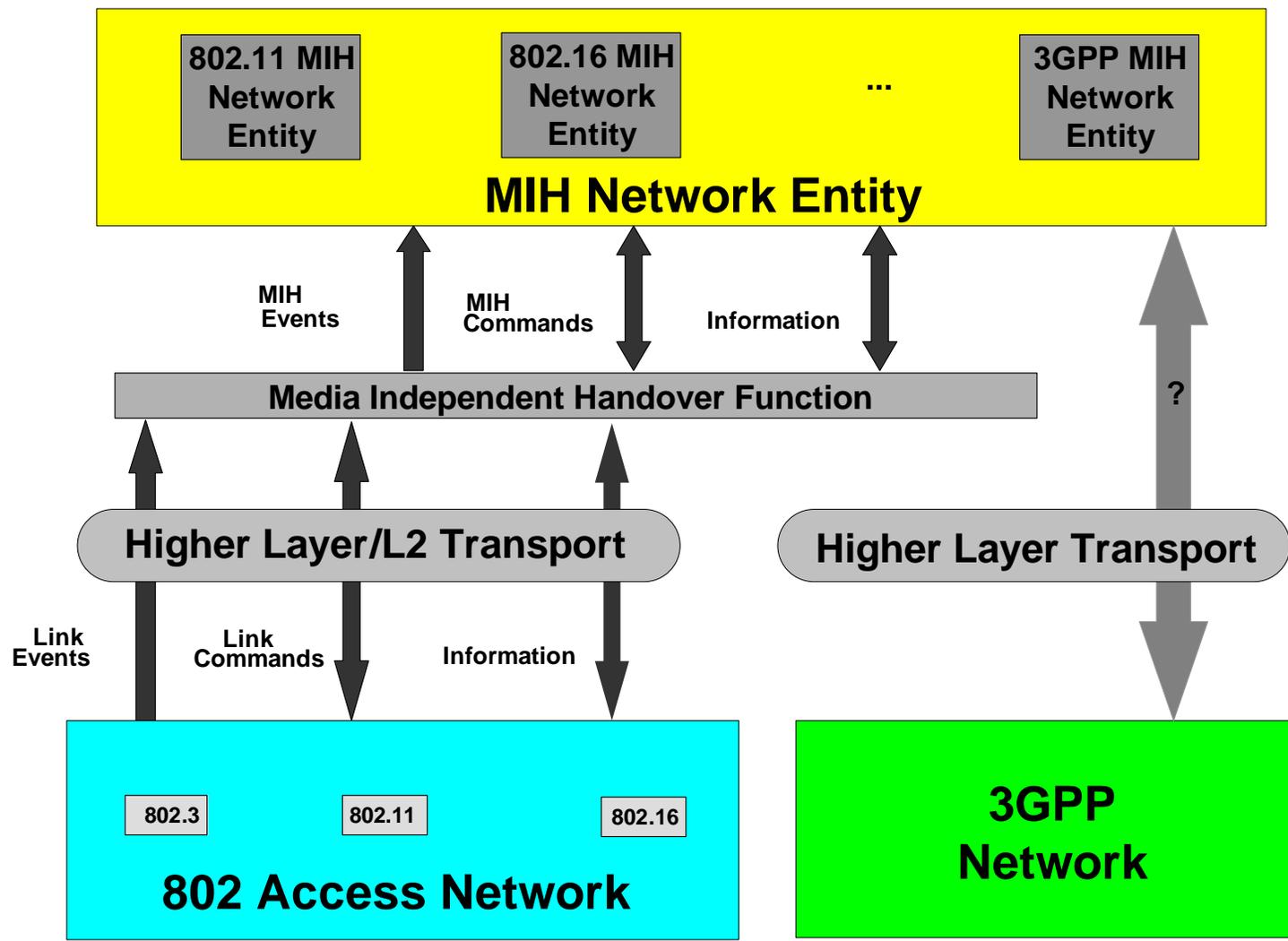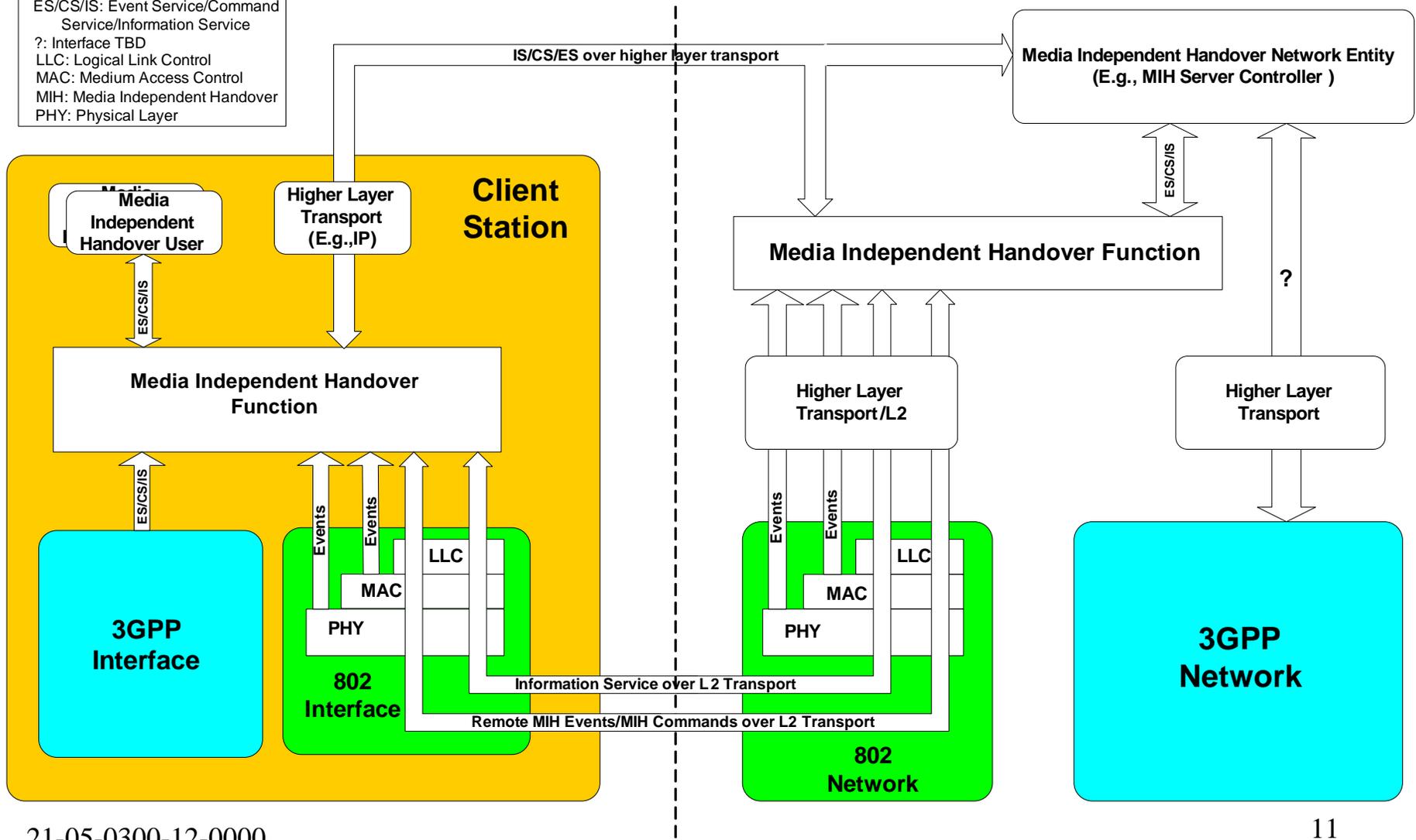
IEEE 802.21 Model

Leyend:
ES/CS/IS: Event Service/Command
    Service/Information Service
?: Interface TBD
LLC: Logical Link Control
MAC: Medium Access Control
MIH: Media Independent Handover
PHY: Physical Layer

IS/CS/ES over higher layer transport

Media Independent Handover Network Entity
(E.g., MIH Server Controller)

ES/CS/IS

Media Independent Handover Function

Client Station

Media Independent Handover User

Higher Layer Transport (E.g.,IP)

ES/CS/IS

Media Independent Handover Function

ES/CS/IS

Events

Events

Higher Layer Transport /L2

Events

Events

Higher Layer Transport

?

3GPP Interface

LLC

MAC

PHY

LLC

MAC

PHY

3GPP Network

802 Interface

802 Network

Information Service over L 2 Transport

Remote MIH Events/MIH Commands over L2 Transport

Current IEEE 802.21 Draft Scope

- Media Independent Handover Principles and Design Assumptions
- Supported Media Independent Services
- Service Access Points and their Primitives
- A protocol for the transport of Media Independent Handover services

Design Assumptions

Design Assumptions Dos:

- IEEE 802.21 cross-layer entity interacting with multiple layers.
- IEEE 802.21 Facilitates handover determination through a technology-independent unified interface to MIH users
- IEEE 802.21 facilitates both station initiated and network initiated handover determination.

Design Assumptions Don'ts

- IEEE 802.21 does not modify existing handover principles
- IEEE 802.21 does not mandate handover determination based on IEEE 802.21 events

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Media Independent Services

Media Independent Services Dos:

- MIH Users access IEEE 802.21 services through well defined SAPs
- More than one user can have access to IEEE 802.21 services in order to integrate multiple mobility protocols
- IEEE 802.21 services could be invoked to request operations on underlying resources

Media Independent Services Don'ts

- IEEE 802.21 does not replaces existing mobility management function and protocols already in place

Media Independent Services (cont'd)

Media Independent Event Services:

- **Event Service Dos**
  - Local and Remote Events are supported
  - Events might indicate link layer or physical layers state changes in real time
  - Events facilitate handover detection
  - Events are delivered according to IEEE 802.21 users preferences
- **Events Service Don'ts**
  - Events do not propagate directly between heterogeneous stacks
  - Events do not enforce actions but rather suggest them

Media Independent Services (cont'd)

Media Independent Information Services:

- **Information Service Dos**
  - Provides heterogeneous network information within a particular geographical area
  - Information might be delivered through access technology broadcast/multicast procedures or through data base queries at a remote server
  - Information services are static in nature
- **Information Service Don'ts**
  - IEEE 802.21 does not define how the information server is accessed, but only what information is required
  - IEEE 802.21 does not specify how the information service might be implemented in a particular technology

Media Independent Services (cont'd)

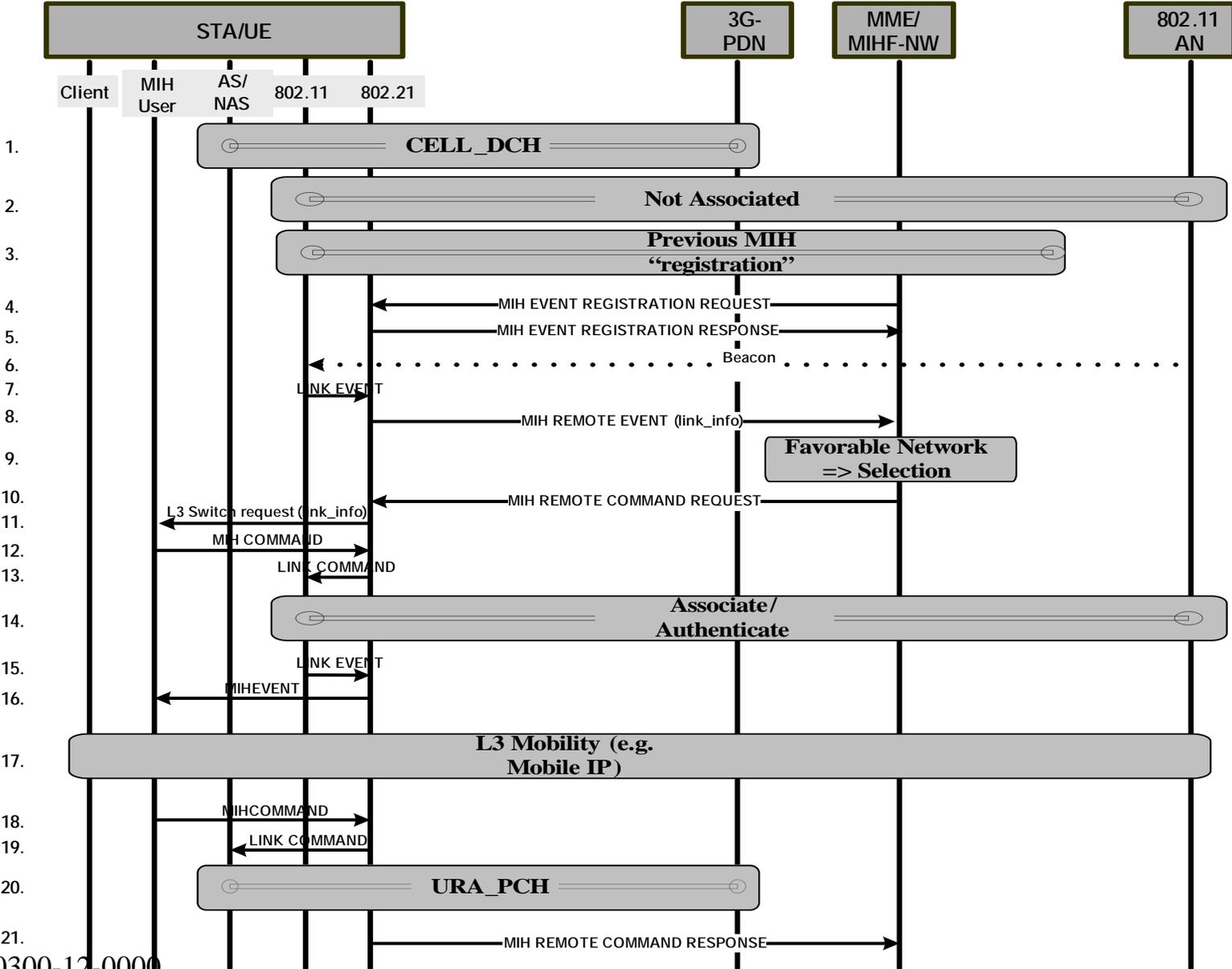## Media Independent Command Services:

- **Command Service Dos**
  - Commands might flow from the IEEE 802.21 MIH user to IEEE 802.21 MIH and from IEEE 802.21 MIH to link layer entities
  - Commands might convey IEEE 802.21MIH user decision to switch from one access technology to the other.
  - Commands have both remote and local scope

- **Command Service Don'ts**
  - Commands do not flow directly from one access technology to other
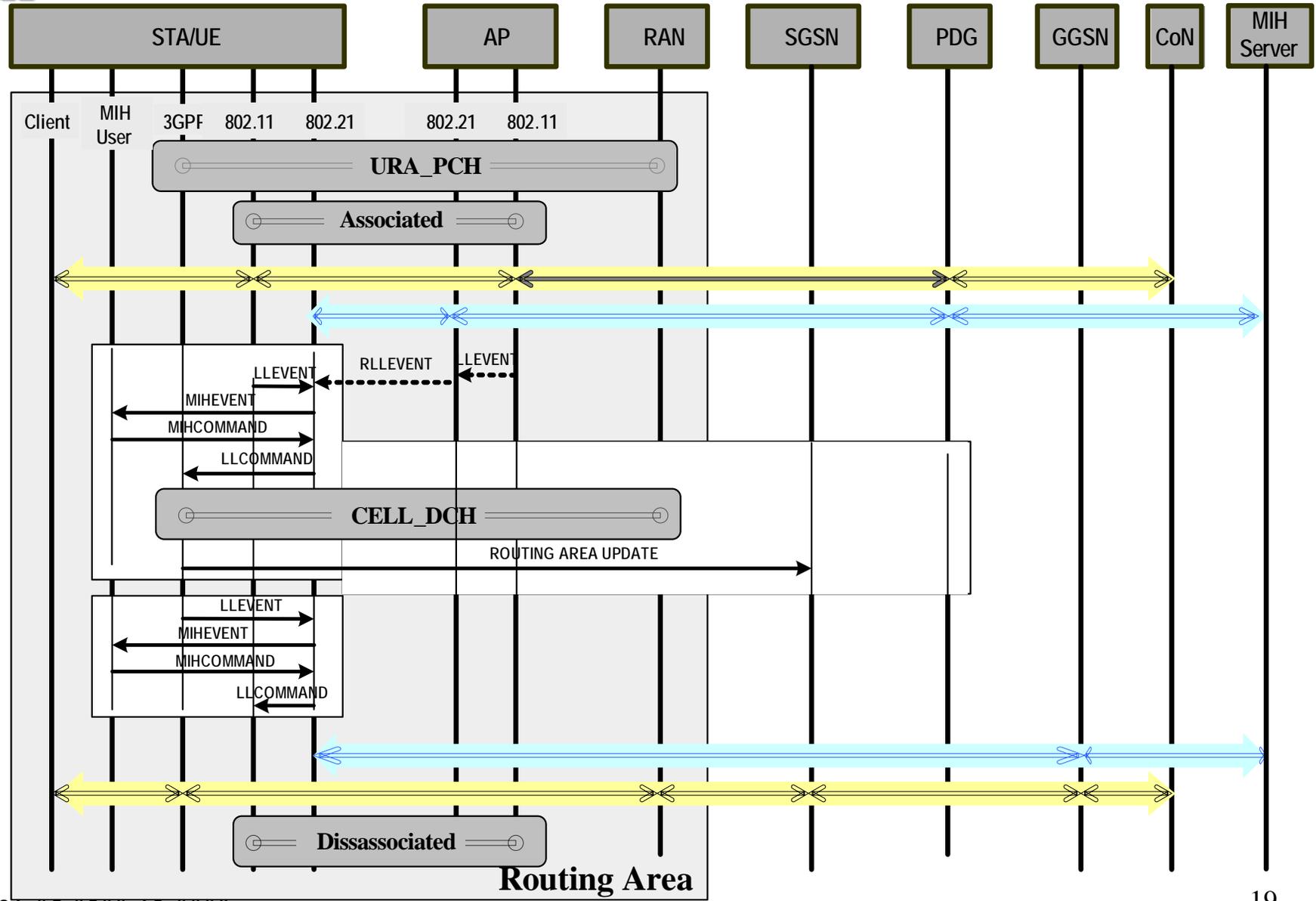 - Commands do not replace existing mobility management protocols and procedures.

3GPP-WLAN Example

Sequence diagram with participants: STA/UE (Client, MIH User, AS/NAS, 802.11, 802.21), 3G-PDN, MME/MIHF-NW, 802.11 AN

1. CELL_DCH
2. Not Associated
3. Previous MIH "registration"
4. MIH EVENT REGISTRATION REQUEST
5. MIH EVENT REGISTRATION RESPONSE
6. Beacon
7. LINK EVENT
8. MIH REMOTE EVENT (link_info)
9. Favorable Network => Selection
10. MIH REMOTE COMMAND REQUEST
11. L3 Switch request (link_info)
12. MIH COMMAND
13. LINK COMMAND
14. Associate/ Authenticate
15. LINK EVENT
16. MIHEVENT
17. L3 Mobility (e.g. Mobile IP)
18. MIHCOMMAND
19. LINK COMMAND
20. URA_PCH
21. MIH REMOTE COMMAND RESPONSE

WLAN-3GPP Example

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Conclusion

- **3GPP has identified intersystem mobility requirements that might benefit from IEEE 802.21 services**
- **IEEE 802.21 would like to work together with 3GPP experts to find how IEEE 802.21 might satisfy these requirements**