Signaling Requirements at the Optical UNI
## *draft-bala-mpls-optical-uni-signaling-00.txt*

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About this Draft

- Describes the domain services model and the optical UNI
- Describes the signaling requirements at the UNI
- Describes the UNI abstract messages and parameters
- Objectives:
  - Guide the development of an MP?S capability set for UNI signaling (extensions to RSVP/LDP)
  - Harmonize MP?S mechanisms and attributes with UNI definition/requirements from OIF
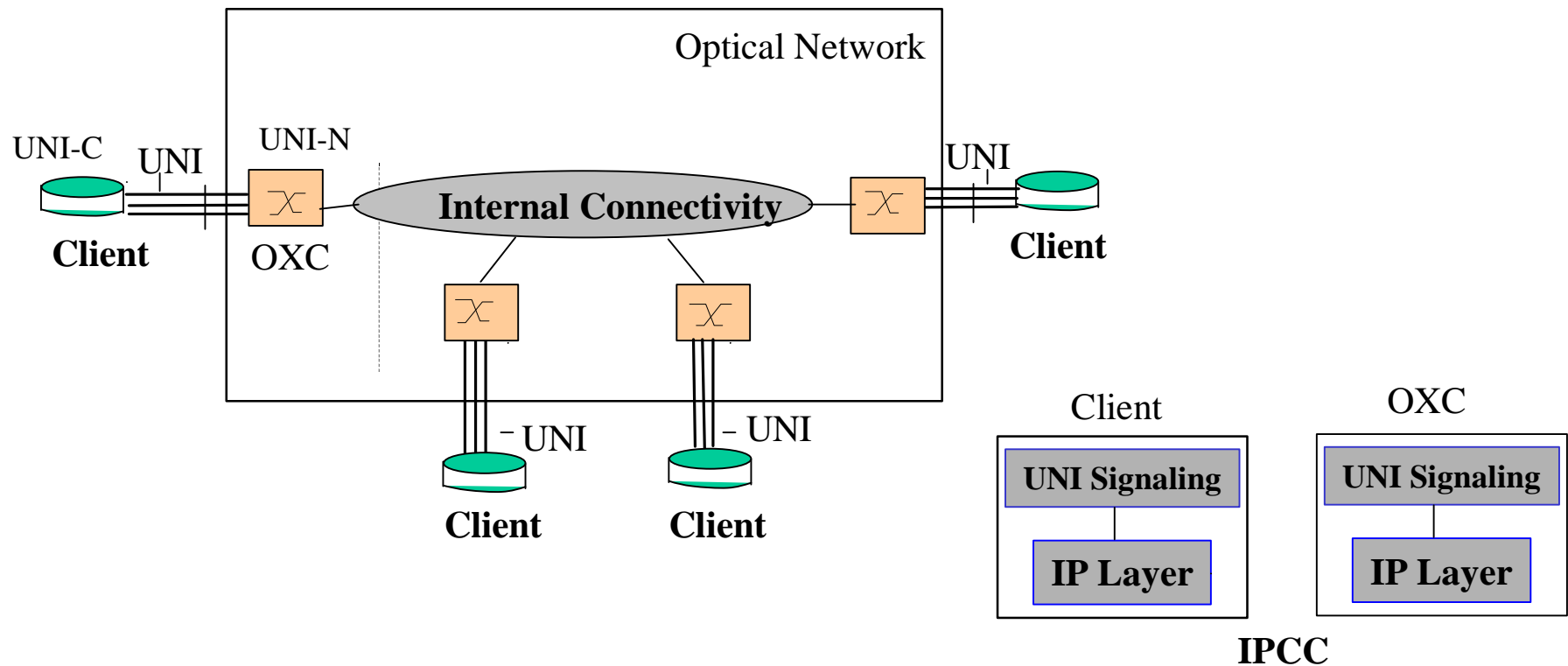
The Domain Services Model

- Optical network provides well-defined services (e.g., lightpath set-up)
- Client-optical interface is defined by actions for service invocation
- Client and optical domains operate independently; need not have any routing information exchange across the interface
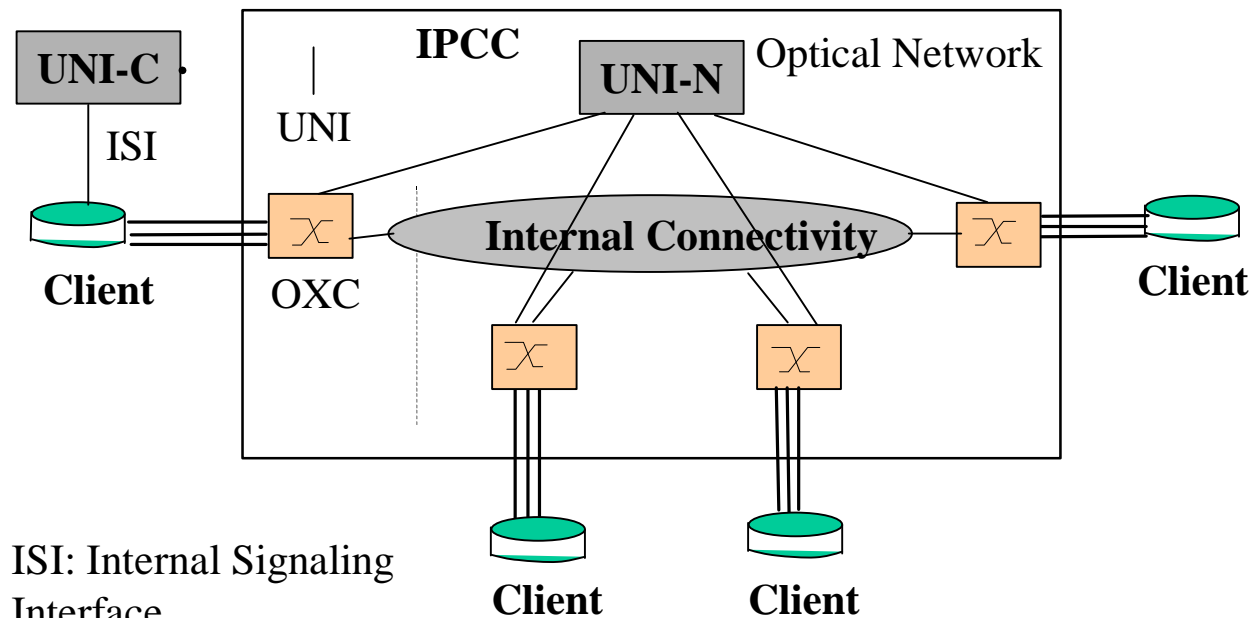
Client Network

Client Network

Optical Cloud

UNI

UNI

Physical connectivity

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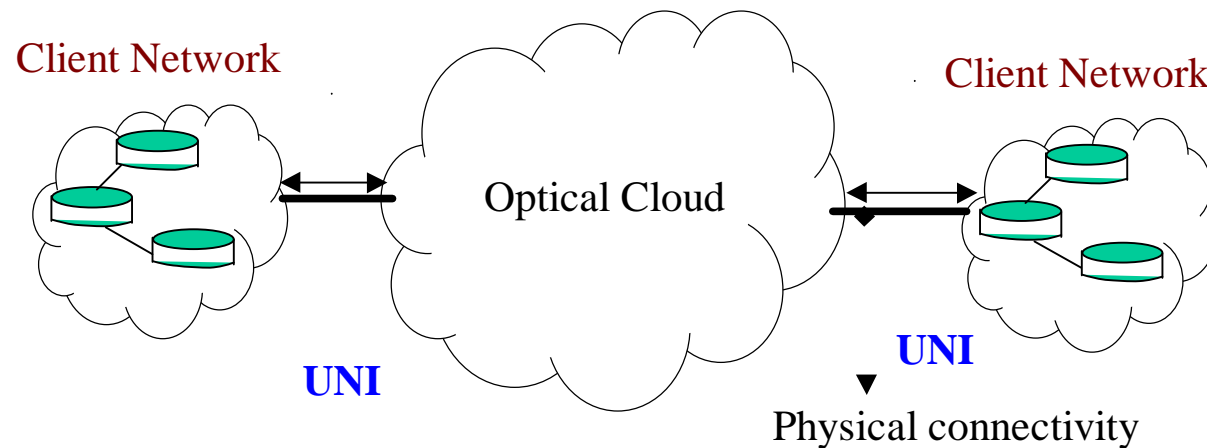
Direct and Indirect Signaling Interfaces

- Direct Interface: Client equipment and OXC implement UNI signaling over a UNI control channel
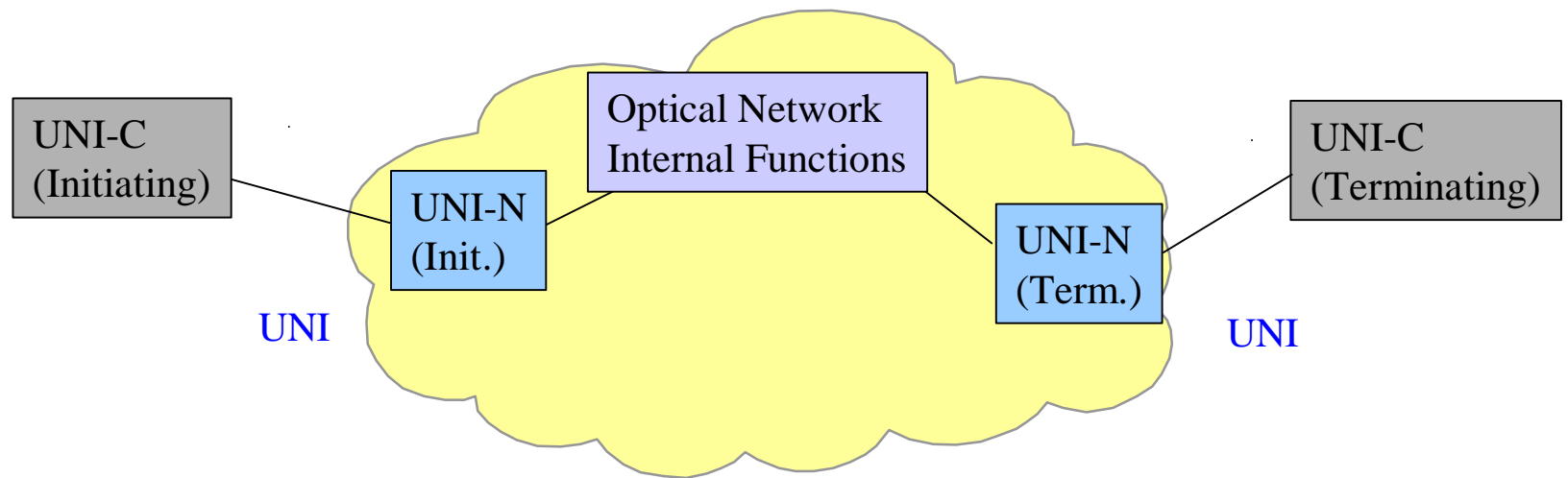
Optical Network

UNI-C UNI UNI-N

Internal Connectivity

Client OXC

UNI

Client

UNI UNI

Client **Client**

Client

UNI Signaling

IP Layer

OXC

UNI Signaling

IP Layer

IPCC

Signaling Interfaces (Contd.)

- Indirect Interface: UNI signaling implemented outside of client and/or OXC

IPCC

UNI-C

UNI-N   Optical Network

ISI   UNI

Internal Connectivity

Client   OXC   Client

ISI: Internal Signaling
Interface

Client   Client

Abstract View of UNI Signaling

UNI-C
(Initiating)

Optical Network
Internal Functions

UNI-C
(Terminating)

UNI-N
(Init.)

UNI-N
(Term.)

UNI

UNI

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Optical Network Services

- Discrete capacity, high-bandwidth connectivity (*lightpaths*)
  - Lightpath Creation, Deletion, Modification, Status Enquiry
- Directory Services
  - Determine client devices of interest
- Supporting Mechanisms
  - Neighbor discovery
  - Service discovery
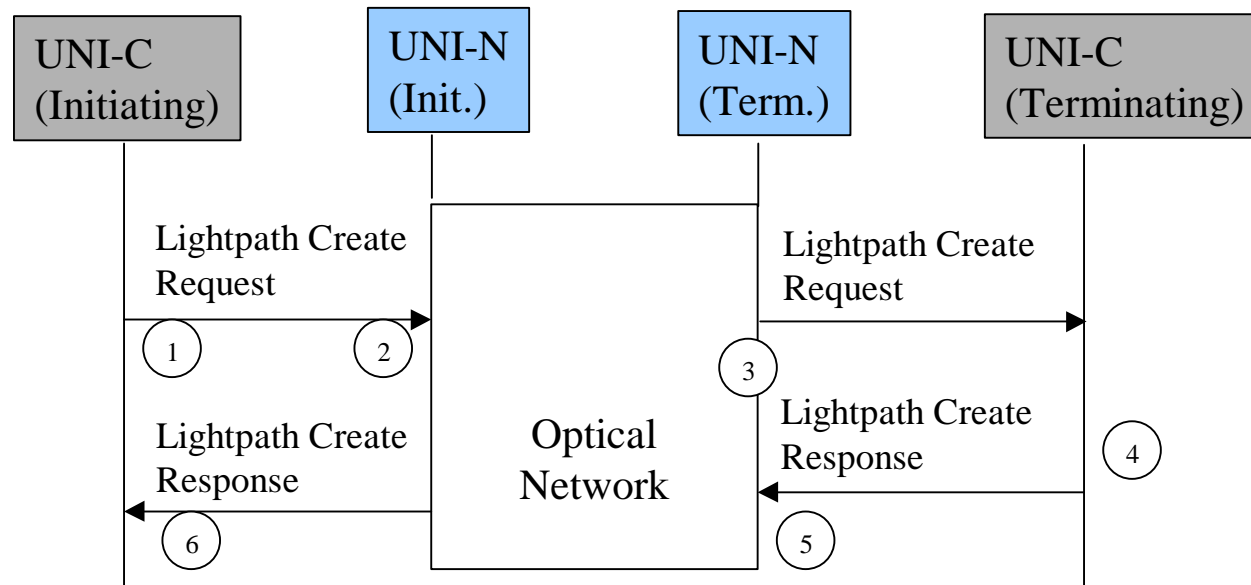
Signaling Requirements

- Automatic or configured determination of UNI control channel endpoints

- UNI control channel must be secure, or UNI-C and UNI-N must implement procedures to recognize authorized messages and to prevent unauthorized access

- When there are multiple physical links between client and OXC, it is necessary to have only a single control channel. The mapping of the control channel to the link must be automatic, ensuring a functional control channel as long as there is at least one physical link available

- Failure of UNI control channel must not result in the removal of lightpaths.

- Failure of UNI CC must be detectable in the absence of UNI messaging, and UNI signaling must have a state synchronization mechanism built in.

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UNI Abstract Messages

- Lightpath Create Request - UNI-C ↔ UNI-N
- Lightpath Create Response - UNI-N ↔ UNI-C
- Lightpath Delete Request - UNI-C ↔ UNI-N
- Lightpath Delete Response - UNI-N ↔ UNI-C
- Lightpath Modify Request - UNI-C ↔ UNI-N
- Lightpath Modify Response - UNI-N ↔ UNI-C
- Lightpath Status Enquiry - UNI-C ↔ UNI-N
- Lightpath Status Response - UNI-N ↔ UNI-C
- Notification - UNI-N → UNI-C
- Concrete realization based on MP?S signaling constructs

Signaling Example

| UNI-C (Initiating) | UNI-N (Init.) | UNI-N (Term.) | UNI-C (Terminating) |

Lightpath Create Request

Lightpath Create Request

① ② ③

Optical Network

Lightpath Create Response

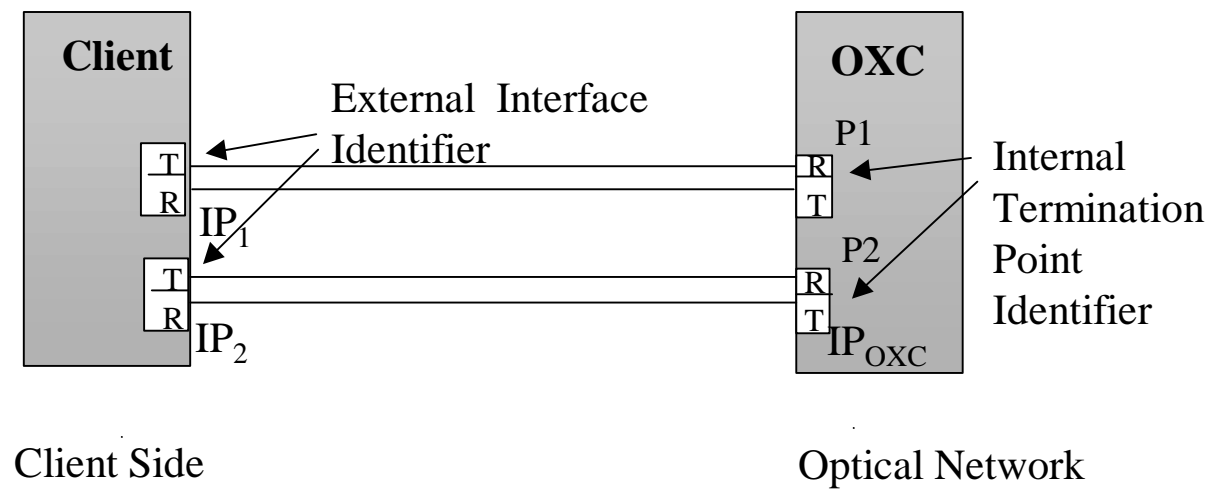Lightpath Create Response

④

⑥ ⑤

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Parameters

- Identification-related
- Service-related
- Routing-related
- Security-related
- Administrative
- Miscellaneous

Identifiers

- Lightpath termination point identifiers
    - Internal ID: {IP address, port ID, channel ID, sub-channel ID}

Client

External Interface Identifier

OXC

P1

Internal Termination Point Identifier

IP_1

IP_2

P2

IP_{OXC}

Client Side

Optical Network

Identifiers (Contd.)

- User Group ID
  - 7-octet VPN ID (RFC 2685)
- Contract ID
  - For service provider use (TBD)
- Lightpath ID
  - Assigned by network to uniquely identify lightpath

Service-Related Parameters

- Directionality: Unidirectional or bi-directional

- Framing: PDH, SONET, SDH, Digital Wrapper, LAN & WAN Ethernet

- Bandwidth: Depends on framing.
  - PDH: DSn, En
  - SONET/SDH: STS-n/STM-n
  - Digital wrapper: TBD
  - Etc.

- Transparency: Depends on framing
  - For SONET/SDH: PLR-C, STE-C, LTE-C

Service-Related Parameters (Contd.)

- Maximum Acceptable Propagation Delay

- Service Level

    – Service-provider interpreted

- Priority & preemption : TBD

- Protection Mode: Unprotected, 1+1, Shared

Conclusion

- Considered the domain services model and described different service invocation methods
- Described the UNI signaling requirements, abstract messages and parameters
- The objective of the draft is to facilitate the specification of MP?S constructs that can be used to realize the UNI functionality
  - Functionality may be added incrementally to evolve towards more sophisticated interaction models
- The material in the draft reflects ongoing work in OIF. Not all of the concepts described have been approved by OIF.