CDNI Request Routing with SDN

draft-shin-cdni-request-routing-sdn-00
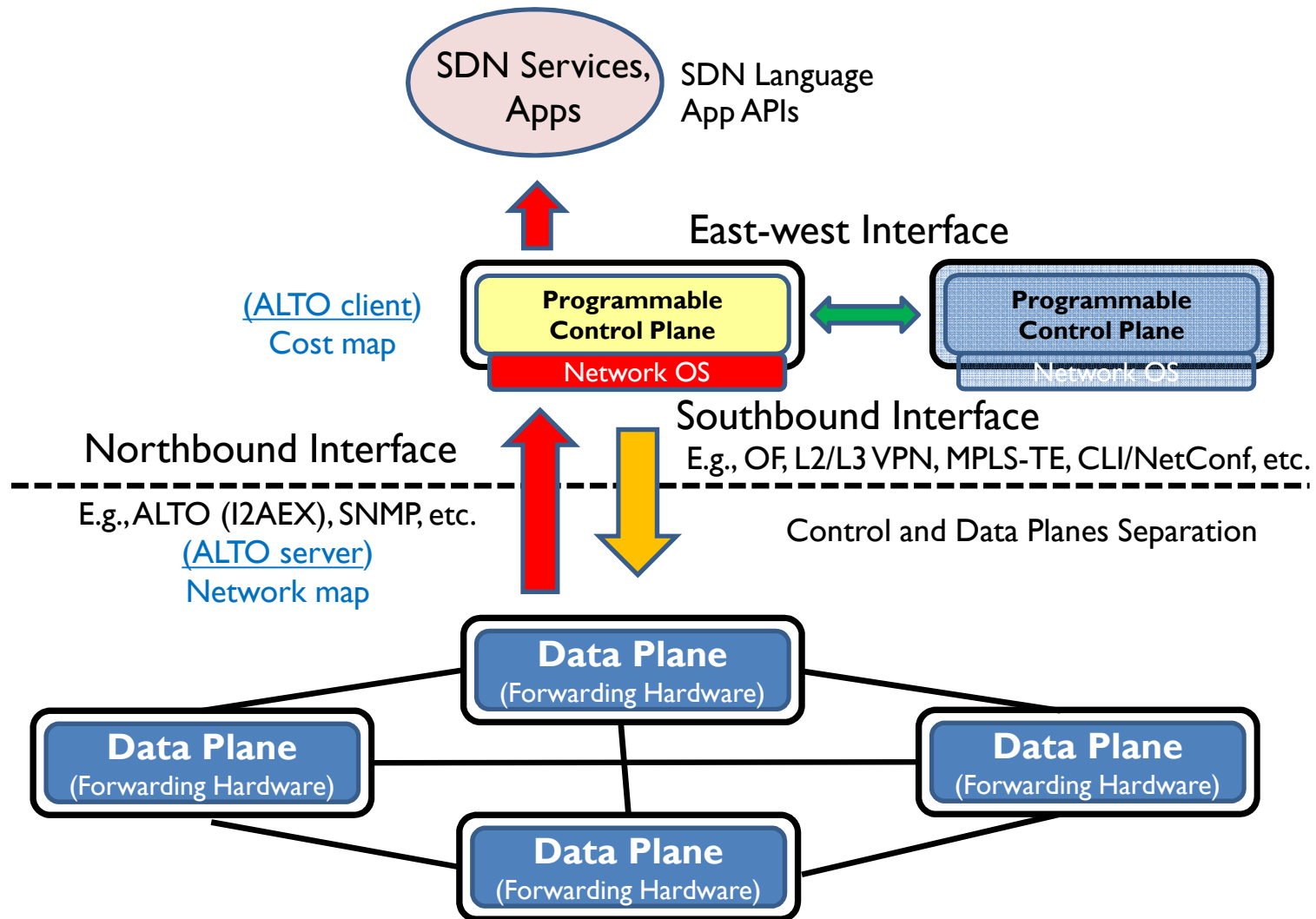
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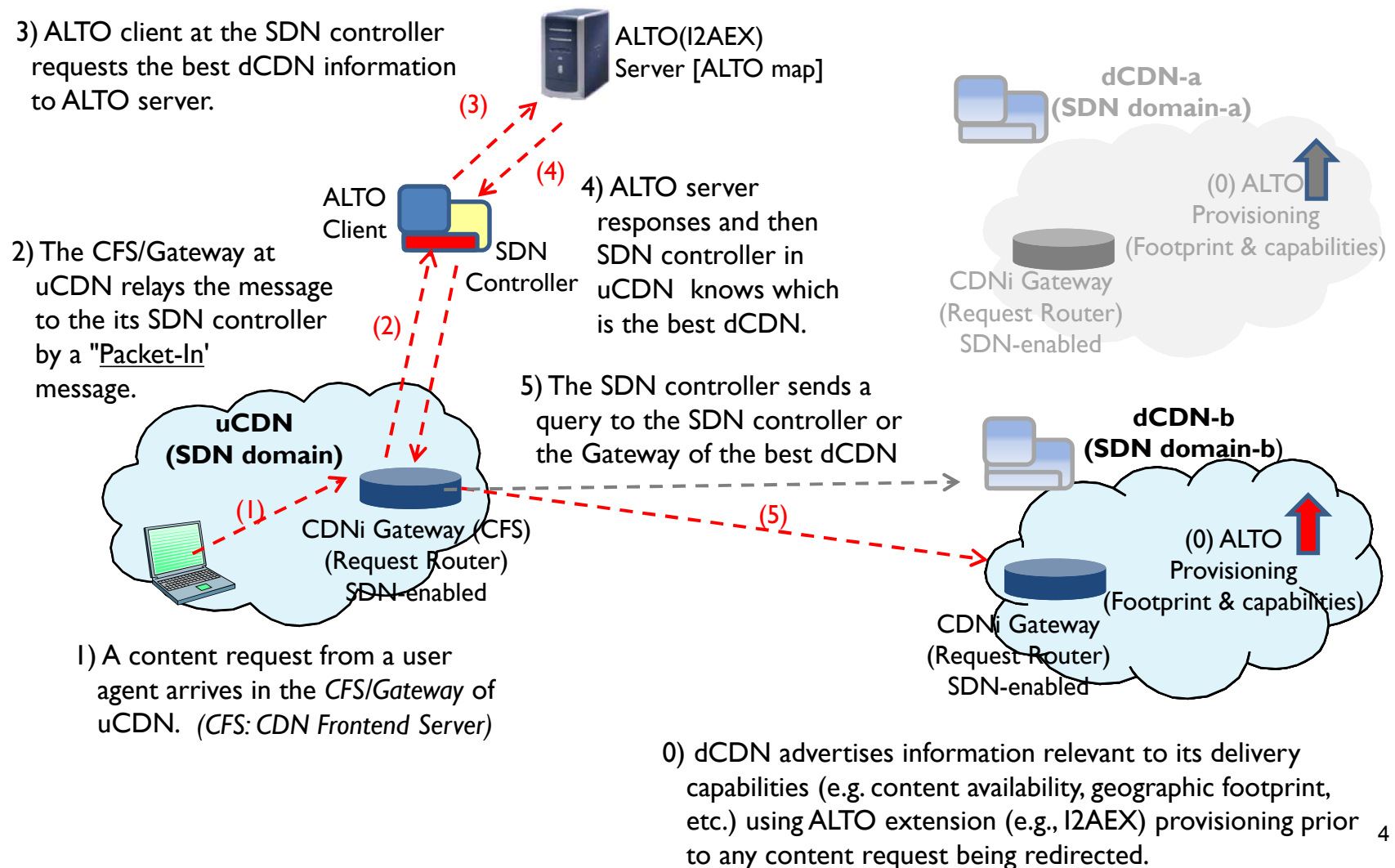CDNi WG Meeting@IETF 84 - Vancouver, BC, Canada

Motivation and Basic Idea

- ## SDN (software-defined networking)
  - One of the most promising technologies to provide centralized, programmable control planes for network service providers

- ## CDNI Request Routing with SDN
  - A new candidates protocol of "Request Routing Interface - Redirection" protocols
    - This draft discusses how SDN can be used for downstream CDN selection within CDNI request routing
  - This topic is quite exploratory, but SDN is emerging within many areas including NSP's networks, so it could be also considered as one of candidates to facilitate CDNI Request Routing.

SDN Controls - Assumption

SDN Services, Apps

SDN Language
App APIs

East-west Interface

(ALTO client)
Cost map

Programmable Control Plane

Network OS

Programmable Control Plane

Network OS

Southbound Interface

Northbound Interface

E.g., OF, L2/L3 VPN, MPLS-TE, CLI/NetConf, etc.

E.g., ALTO (I2AEX), SNMP, etc.
(ALTO server)
Network map

Control and Data Planes Separation

Data Plane
(Forwarding Hardware)

Data Plane
(Forwarding Hardware)

Data Plane
(Forwarding Hardware)

Data Plane
(Forwarding Hardware)

Example of Selecting a dCDN with SDN (+ ALTO)

3) ALTO client at the SDN controller requests the best dCDN information to ALTO server.

ALTO(I2AEX)
Server [ALTO map]

dCDN-a
(SDN domain-a)

(0) ALTO
Provisioning
(Footprint & capabilities)

CDNi Gateway
(Request Router)
SDN-enabled

ALTO Client

SDN Controller

4) ALTO server responses and then SDN controller in uCDN knows which is the best dCDN.

2) The CFS/Gateway at uCDN relays the message to the its SDN controller by a "Packet-In" message.

uCDN
(SDN domain)

5) The SDN controller sends a query to the SDN controller or the Gateway of the best dCDN

dCDN-b
(SDN domain-b)

(0) ALTO
Provisioning
(Footprint & capabilities)

CDNi Gateway (CFS)
(Request Router)
SDN-enabled

CDNi Gateway
(Request Router)
SDN-enabled

1) A content request from a user agent arrives in the *CFS/Gateway* of uCDN. *(CFS: CDN Frontend Server)*

0) dCDN advertises information relevant to its delivery capabilities (e.g. content availability, geographic footprint, etc.) using ALTO extension (e.g., I2AEX) provisioning prior to any content request being redirected.

4

Advantages and Further Consideration

- Advantages of using SDN
  - Synchronous CDNI operations
  - Integrated with SDN architecture (e.g., OpenFlow)
    - More centralized, programmable (e.g., SDN apps for CDNi)
    - Traffic isolated with desired QoS/QoE
  - More extensible (suitable for i2aex)
  - Mobile support, possibly

- Further considerations
  - ALTO extension (i2aex)
  - Northbound interfaces of SDN
  - Multi-controllers
  - (East-west bound interfaces between SDN controllers)