GIBSON: Global IP-Based Service-Oriented Network

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Why Are We Here?

- The combination of ownership diversity and technology diversity is reflected in a more complex set of management interfaces to control infrastructure:
    - Access/metro and backbone networks may belong to different carriers or business entities
    - Different technologies among providers (Metro/Access and Core networks)
    - Different service "values": per-flow for video streams vs. per-aggregation group for voice sessions vs. best-effort
    - Regulatory issues such as intercept/surveillance which may result in routing and aggregation decisions

- Difficult to control user traffic
    - Core networks have no ability or incentive to provide special treatment on *important* user flows
    - End-user congestion and flow control (e,g, TCP) may not be sufficient
    - Routing mechanisms like OSPF or IS-IS may not be good enough when it comes to business-based route selection

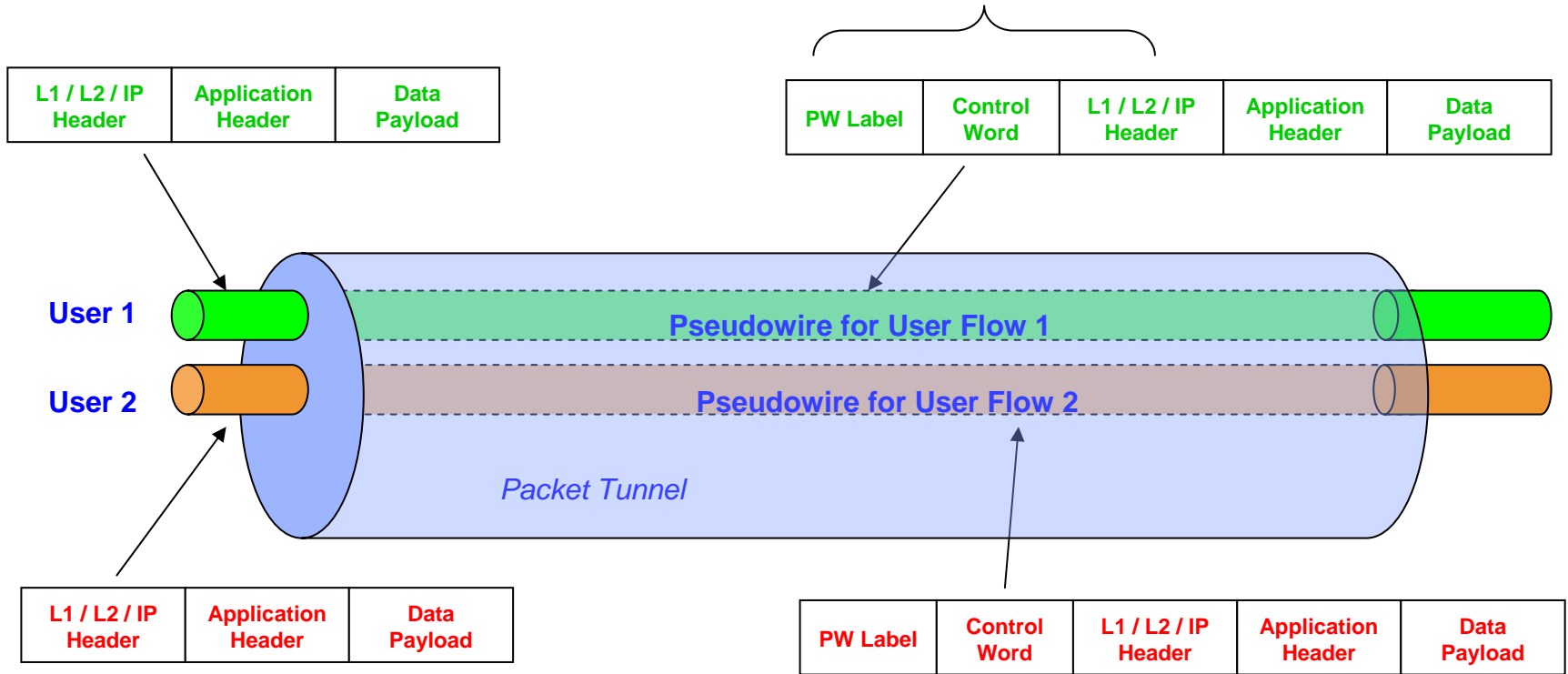- Providers need to create more services with manageable operation cost

GIBSON Architecture and Operation Overview
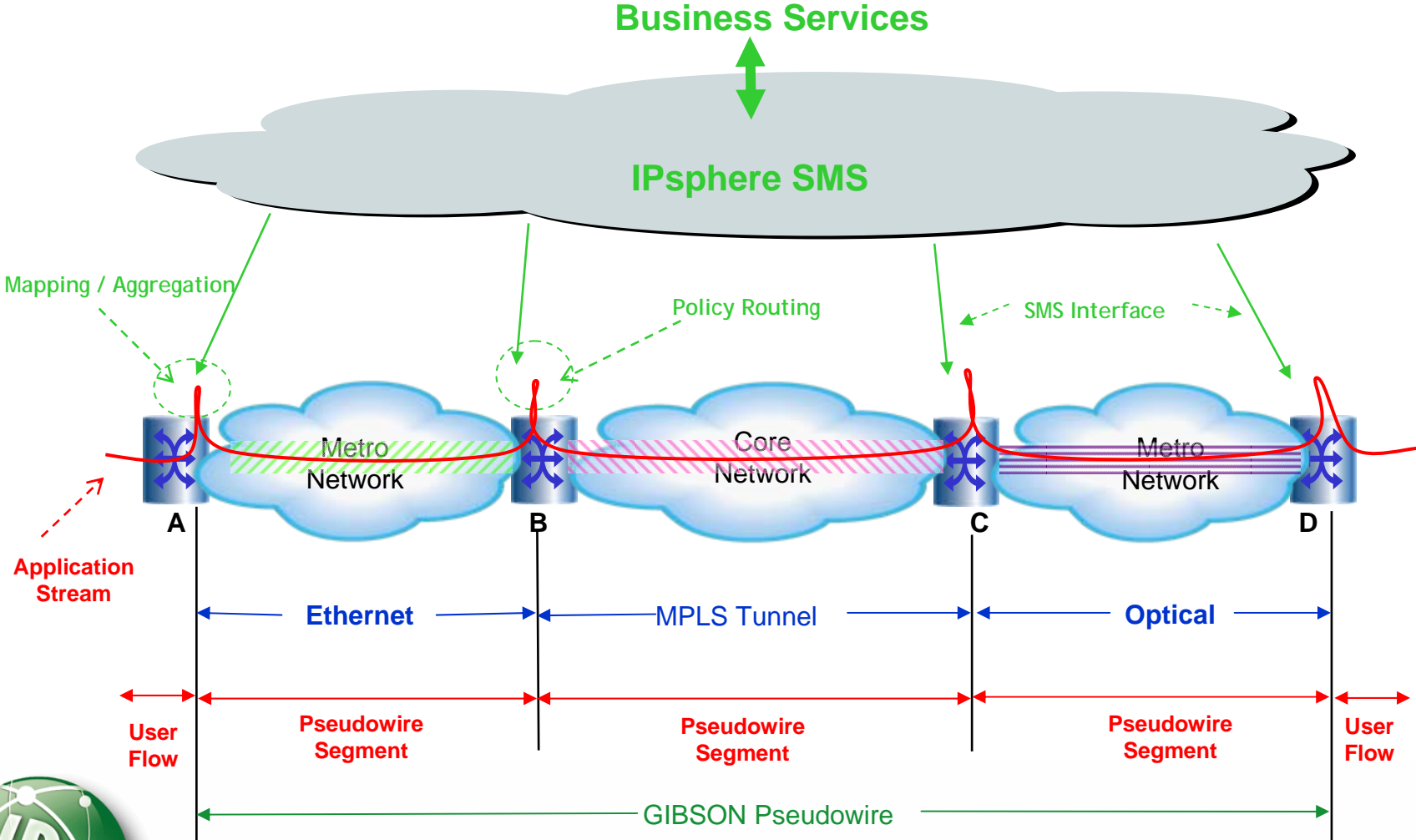
A Review of Pseudowire

Today's Pseudowire Definition:
- Encapsulate based on L1/L2 and IP headers
- Emulate low layer services (OAM etc.)

L1 / L2 / IP Header	Application Header	Data Payload

PW Label	Control Word	L1 / L2 / IP Header	Application Header	Data Payload

User 1

User 2

Pseudowire for User Flow 1

Pseudowire for User Flow 2

Packet Tunnel

L1 / L2 / IP Header	Application Header	Data Payload

PW Label	Control Word	L1 / L2 / IP Header	Application Header	Data Payload

GIBSON Pseudowire Definition:
- Encapsulate based on application headers
- Emulate high layer services (rate adaptation etc.)

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4

Pseudowire provides the following today...

- Transport Agnostic
  - Pseudowires can support IP and Ethernet, and even optical cross-connections

- IP-friendly
  - Pseudowires are provisioned and controlled via IP control plane

- Inter-network capable
  - PWE3 multi-hop [MHOP] and switching [SWITCH] techniques enable the providers to provision Pseudowires over multiple intra-domain or inter-domain networks.

- VPN capable
  - Pseudowire has been extended in IETF to create a nested topology for VPN applications, which include VPLS and VPWS.

- SLA capable
  - Pseudowire technique can provide QoS, protection and restoration and congestion control functionality at per-flow basis.

- Flow type agnostic
  - Pseudowires can encapsulate any type of data flows. As defined today, Pseudowires can encapsulate Layer-1 flows in SONET/SDH format (the technique is known as Circuit Emulation), Layer-2 flows such as ATM, Frame Relay, PPP and Ethernet, and IP

All in deployment today

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The Importance of Application-Awareness

- New data services may require per-application-flow management and control:
  - Application flow examples
    - RTP for session-based applications such as VoD and VoIP
    - MPEG for multimedia applications
  - Application flows need to be managed inside the network

- New applications bring an entirely different set of service requirements:
  - Examples:
    - Packet video: tolerate packet out-of-order delivery
    - Packet voice: tolerate packet drop, but not delay
    - "*Seamless Convergence*" offerings: user flows can adapt to the change of link bandwidth, but maintain constant-bit-rate
  - Traditional mechanisms (IEEE 802.1p or IP DiffServ) are not adequate to handle such applications.

Map application flows into Pseudowires ➔ Consistent e2e behavior

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GIBSON Attributes

- **Application-awareness**
  - GIBSON Pseudowires map and aggregate data flows from any layer (i.e., layer 1 to 7)
  - Aggregation method depends on applications:
    - One flow/Pseudowire: high-bandwidth and long-duration VoD streams
    - Multiple flows/Pseudowire: low-speed and short-lived VoIP sessions

- **Business-driven routing**
  - At network border, GIBSON pseudowires are switched based on business-driven routing

- **SMS Interfacing**
  - GIBSON pseudowires are provisioned as a result of SMS Administration, SMS Parent, and SMS Child communication
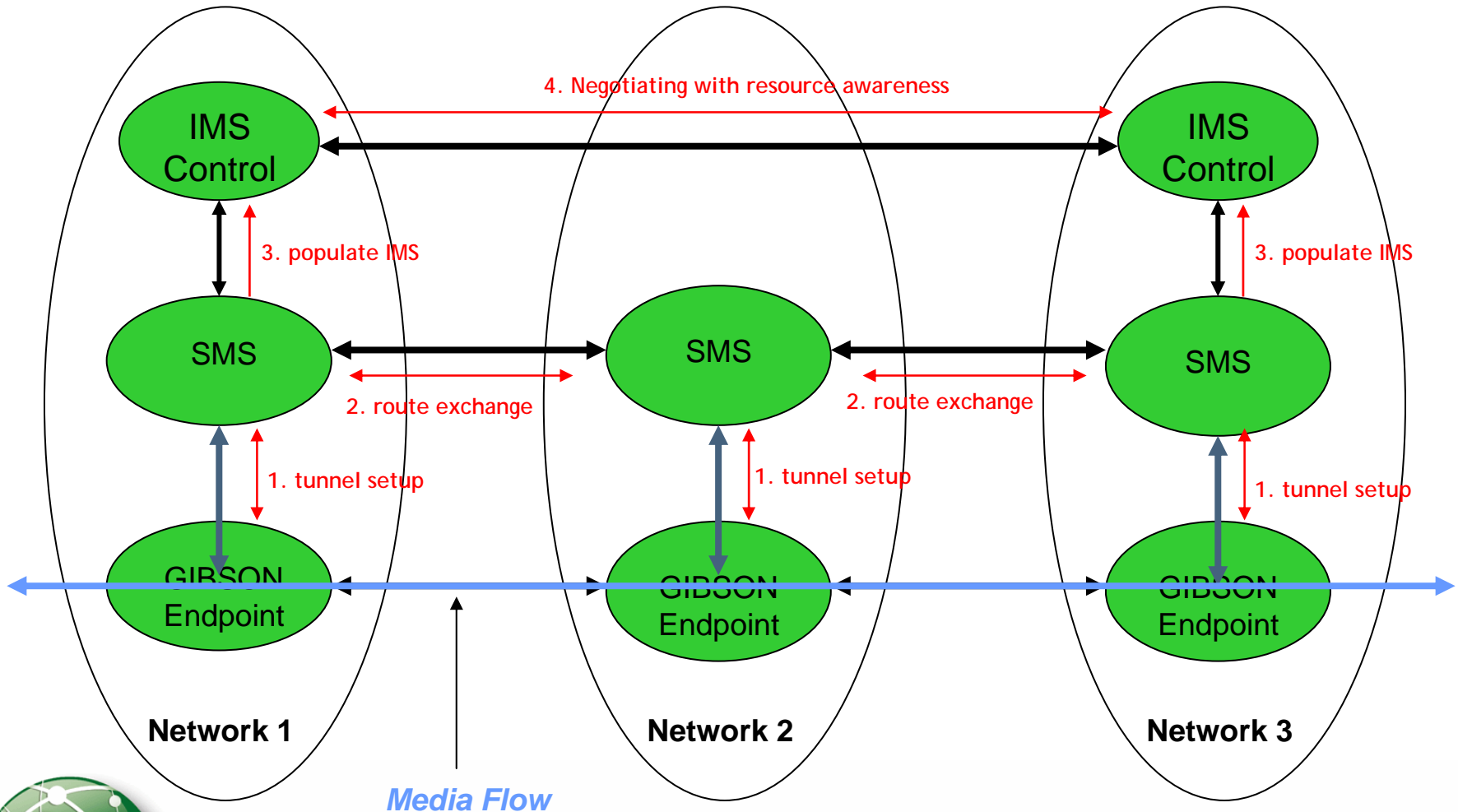
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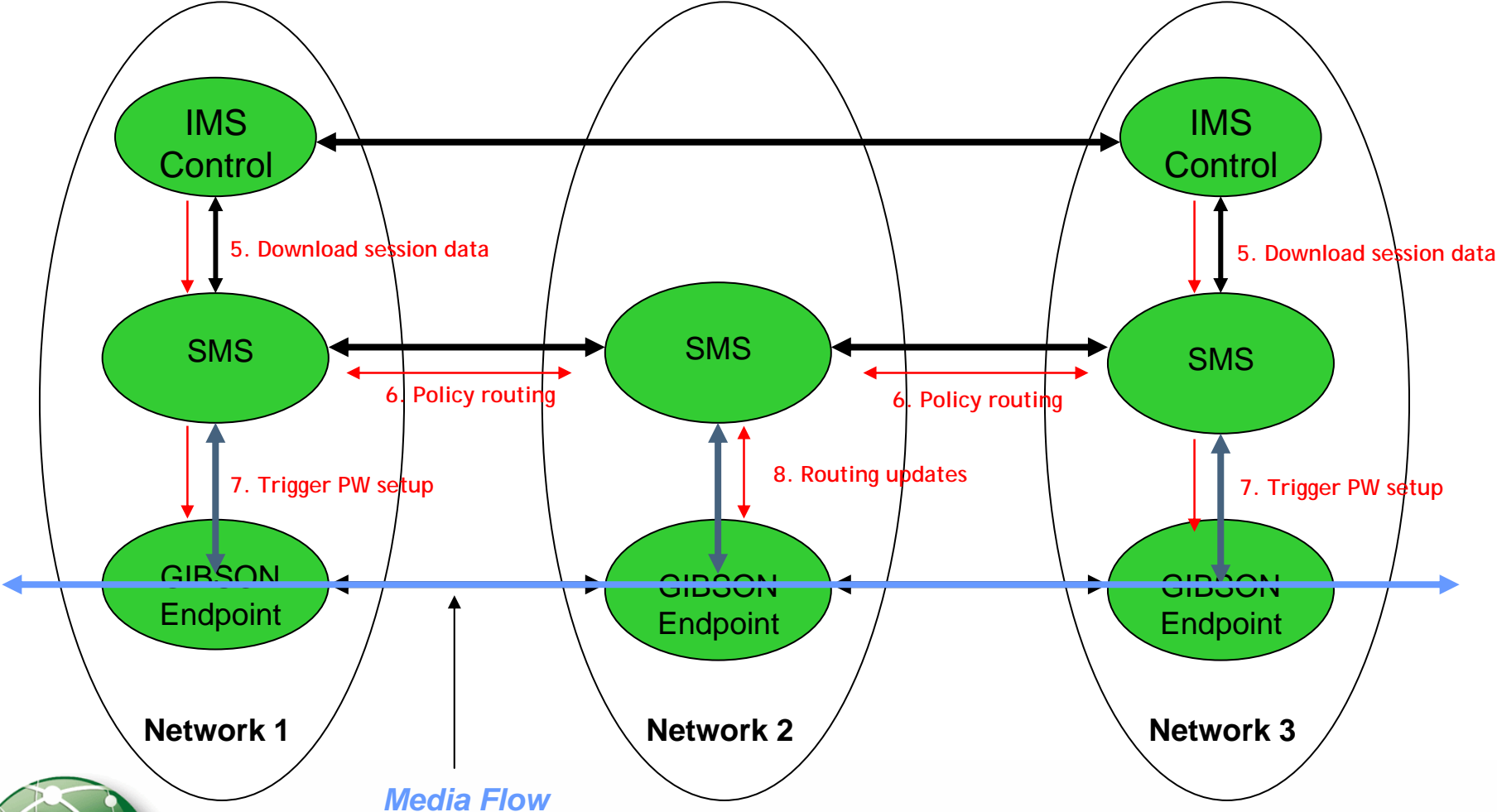
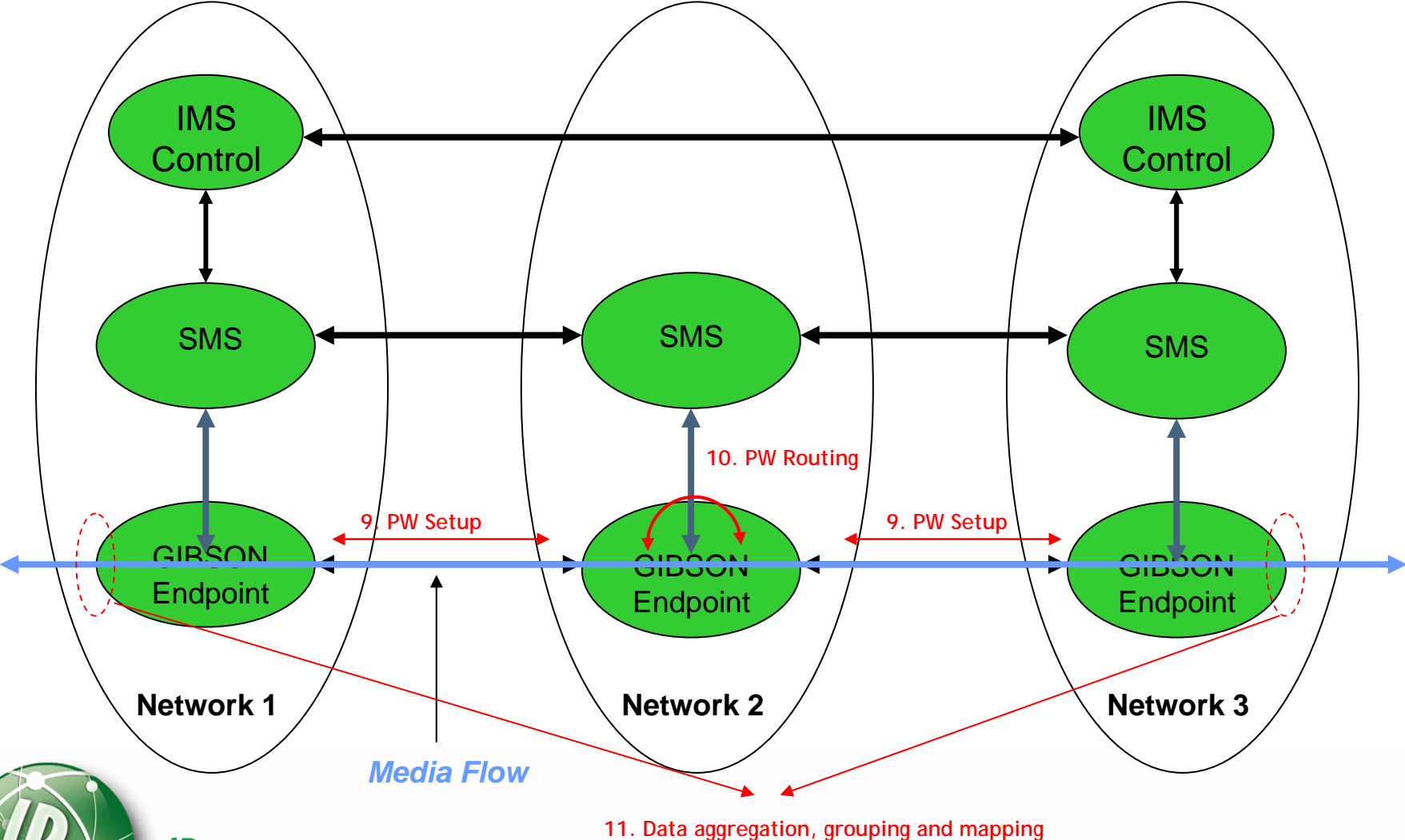# GIBSON Policy Routing
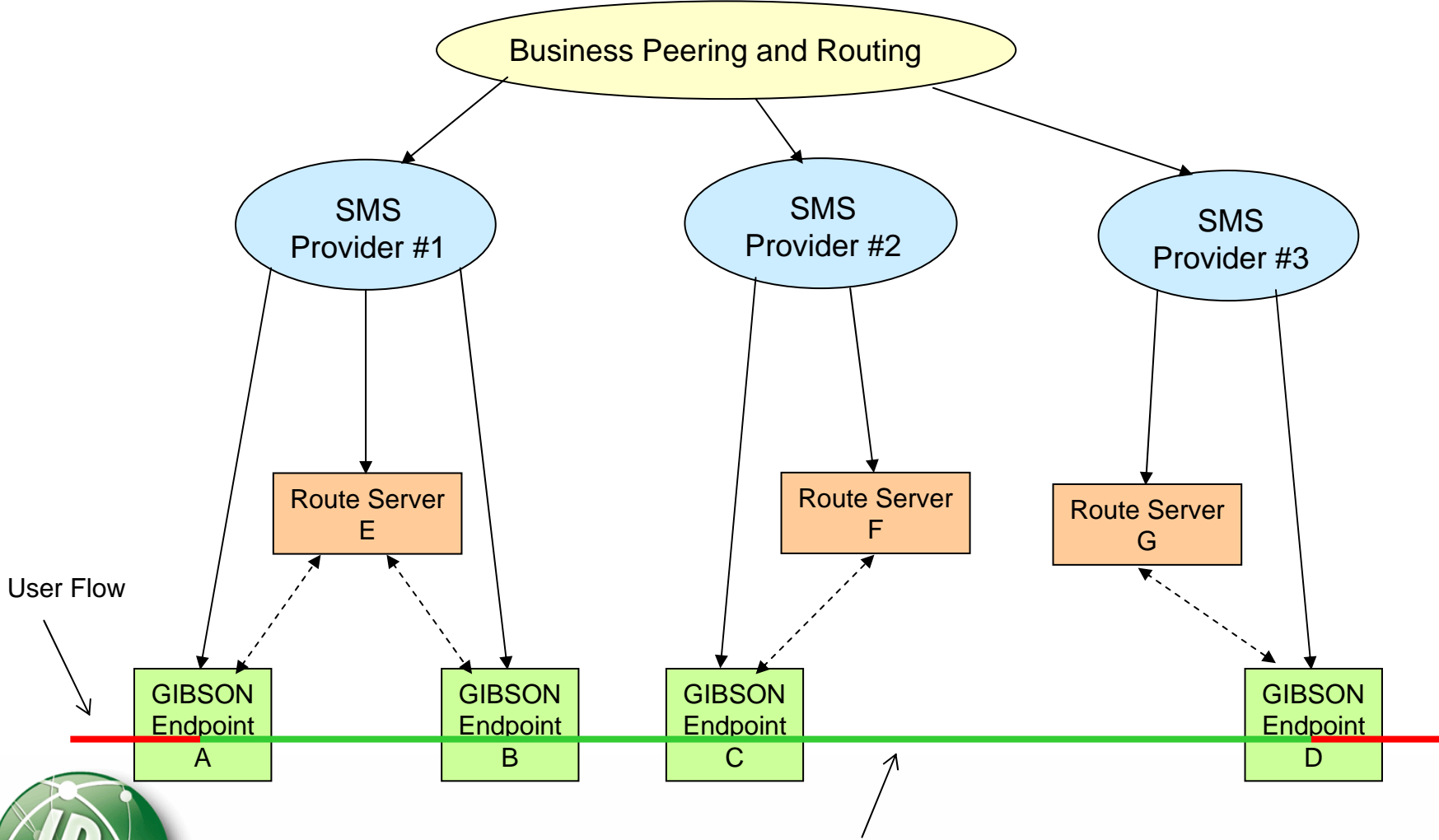
Interfaces in GIBSON
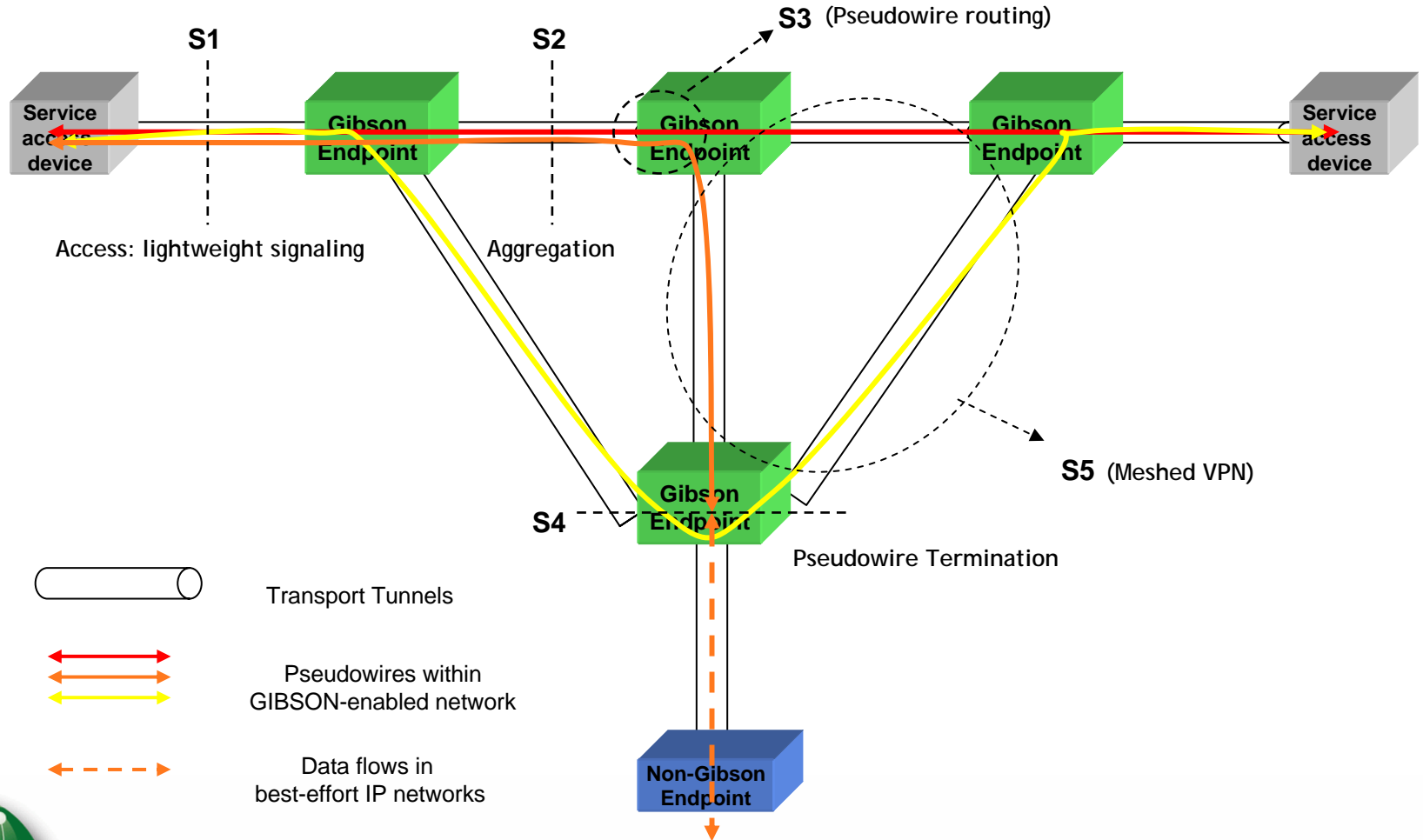
GIBSON: IMS User Case

GIBSON: IMS User Case (cont. 1)

GIBSON: IMS User Case (cont. 2)

Summary on GIBSON

- Open interface for business service creation and provisioning

- Operate in both intra-provider and inter-provider environment

- Provide consistent edge-to-edge per-flow forwarding behavior

- Flow type agnostics – capable of processing flows in any format

- Support for "nesting" of Pseudowires to facilitate traffic management and virtual service creation

- Support for "virtual segments" that envelope multipoint service behavior created by capabilities like RFC 2547, to permit end-to-end multipoint delivery

- Independent of underlying network transport tunneling mechanism

- Applicable on all service devices, with less dependency on IP routing

- Leverage and extend a proven and simple technology: Pseduowire

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What's Next...

- Gather more feedback from service providers

- Define and implement SMS interfaces

- Investigate more on routing interfaces
  - Routing updates, and scalability
  - Interface with PCE

- Investigate more on RACF interfaces
  - How to deal with all those QoS policies?

- Apply GIBSON to other user cases
  - Business access (leased line services)
  - FMC

- Working toward standardizing the GIBSON concept in IPsphere

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