GIBSON: Global IP-Based Service-Oriented Network

Ping Pan, Tom Nolle

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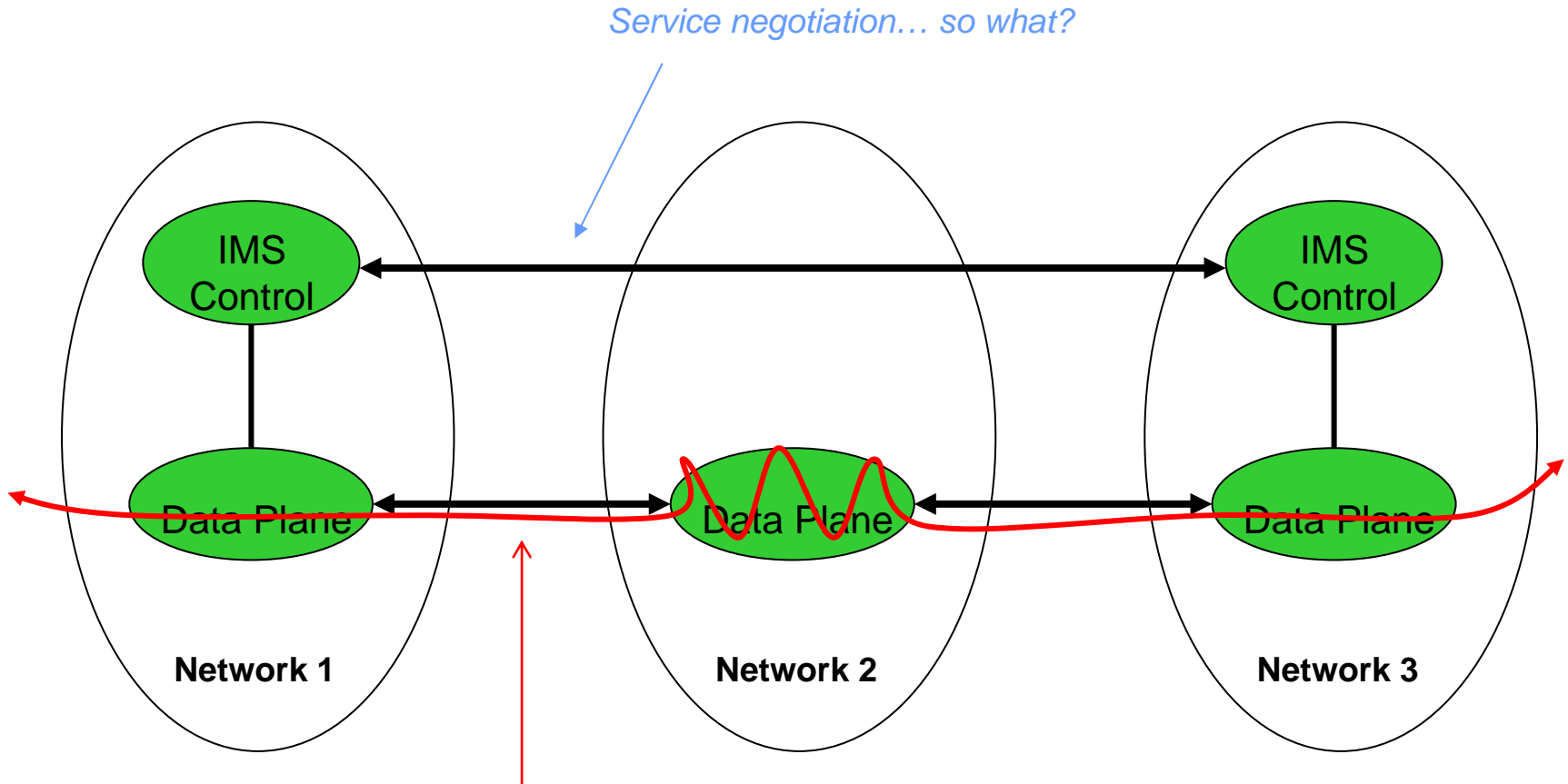
Why Are We Here?

- 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": some per-flow on video streams, or per-aggregation group on voice sessions
  - Regulatory issues such as intercept/surveillance which may result in routing and aggregation decisions

- No control over user traffic within the core:
  - Core networks have no ability or incentive to provide special treatment on *important* user flows
  - Application-based congestion and flow control (e,g, TCP) may not be sufficient
  - Existing mechanisms won't scale as end-user applications become more bandwidth-intensive and delay-sensitive.

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Today's Network (Example)

Service negotiation… so what?

IMS Control — Data Plane — Network 1

Data Plane — Network 2

IMS Control — Data Plane — Network 3

Real-time video stream:
no congestion control, no QoS… no service guarantee

What We Need to Address

- Data aggregation at edge:
  - The data flows may be in many format types depending on the services: Ethernet VLAN, TCP, RTP, MPEG and HTTP, etc.
  - There may be many data flows (in the range of millions) at various granularity
  - Some flows need to have special treatment: rate and delay guarantee, encryption, redundancy and protection, performance monitoring, rate adaptation, traffic acceleration, address remapping, etc.

- Business-based policy routing at network boundary:
  - The policies are driven by bilateral or multi-lateral business arrangement
  - Within core network, the policies may be static and long-lasting
  - At access edge, the policies may be somewhat dynamic depending on service and user behavior

- Service binding between control-plane and data-plane:
  - Map service parameters (SIP/SDP) to network "tunnels"
  - Note: in IMS, control messages and data packets do not necessarily traverse through the same path. Some logical entity needs to correlate flow information from CSCF to packet switches.
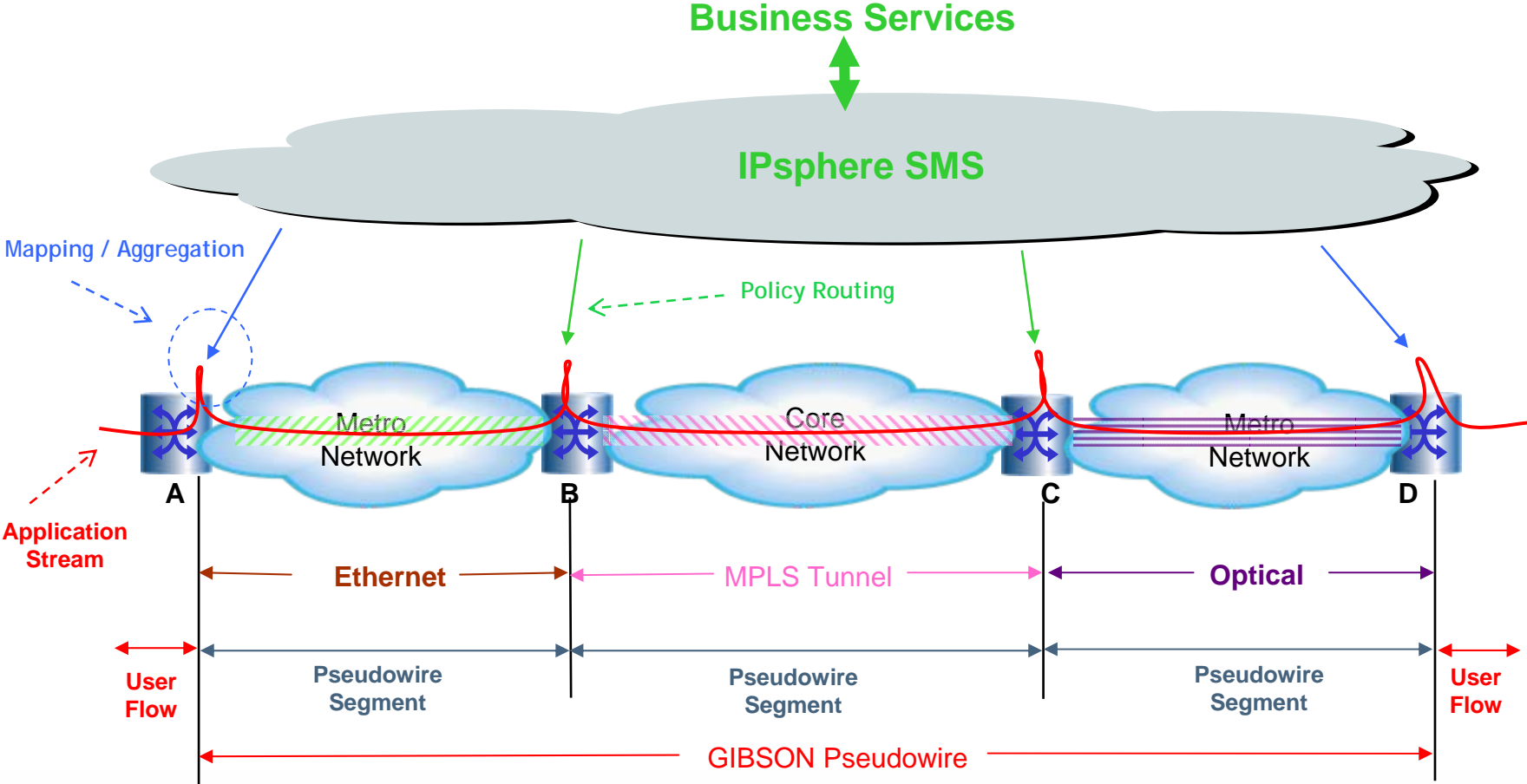
GIBSON (Global IP-Based Service-Oriented Network)

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

- Open interface for business service creation and provisioning

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

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

- Transport agnostic - Independent of underlying network transport tunneling mechanism

- Keep service devices less dependency on IP routing

- Keep data transport gears out of service control plane (KISS)

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GIBSON Architecture

Business Services

IPsphere SMS

Mapping / Aggregation

Policy Routing

Metro Network

Core Network

Metro Network

A   B   C   D

Application Stream

Ethernet   MPLS Tunnel   Optical

User Flow   Pseudowire Segment   Pseudowire Segment   Pseudowire Segment   User Flow

GIBSON Pseudowire

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Why Pseudowire?

- Transport Agnostic:
  - Pseudowires can support IP and Ethernet, and can even remap to optical. Gibson Pseudowires also recognize multipoint transport behavior and can exploit it at the service level to facilitate multipoint services

- IP-friendly
  - Per IETF specification, Pseudowires are provisioned and controlled via IP control plane

- 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

- Application-awareness
  - In the context of GIBSON, Pseudowires can be used to encapsulate application-aware streams such as RTP, MPEG or a group of flows. Application-awareness will enable the GIBSON endpoints to leverage a number of techniques for congestion control, rate adaptation and protection

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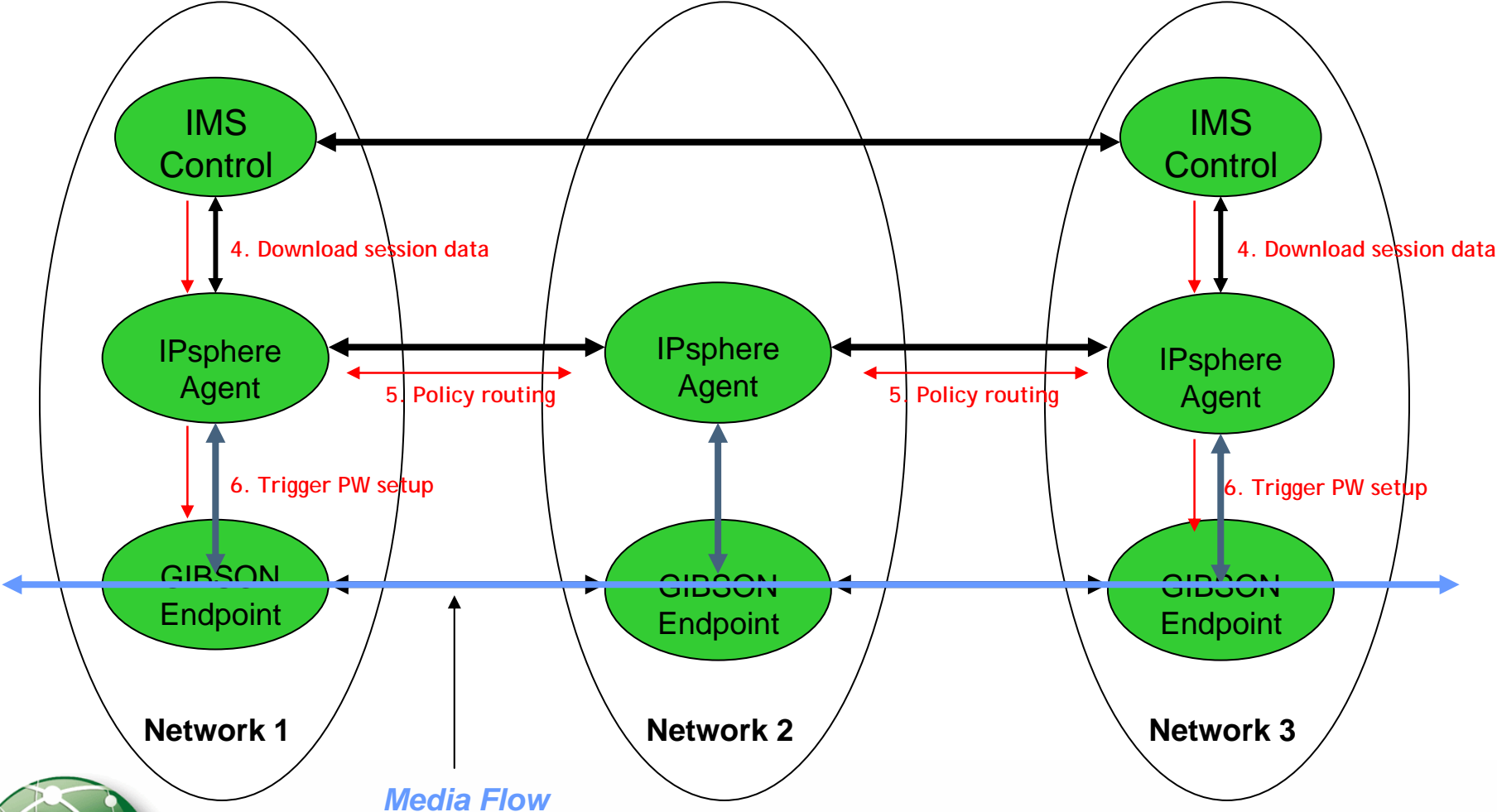
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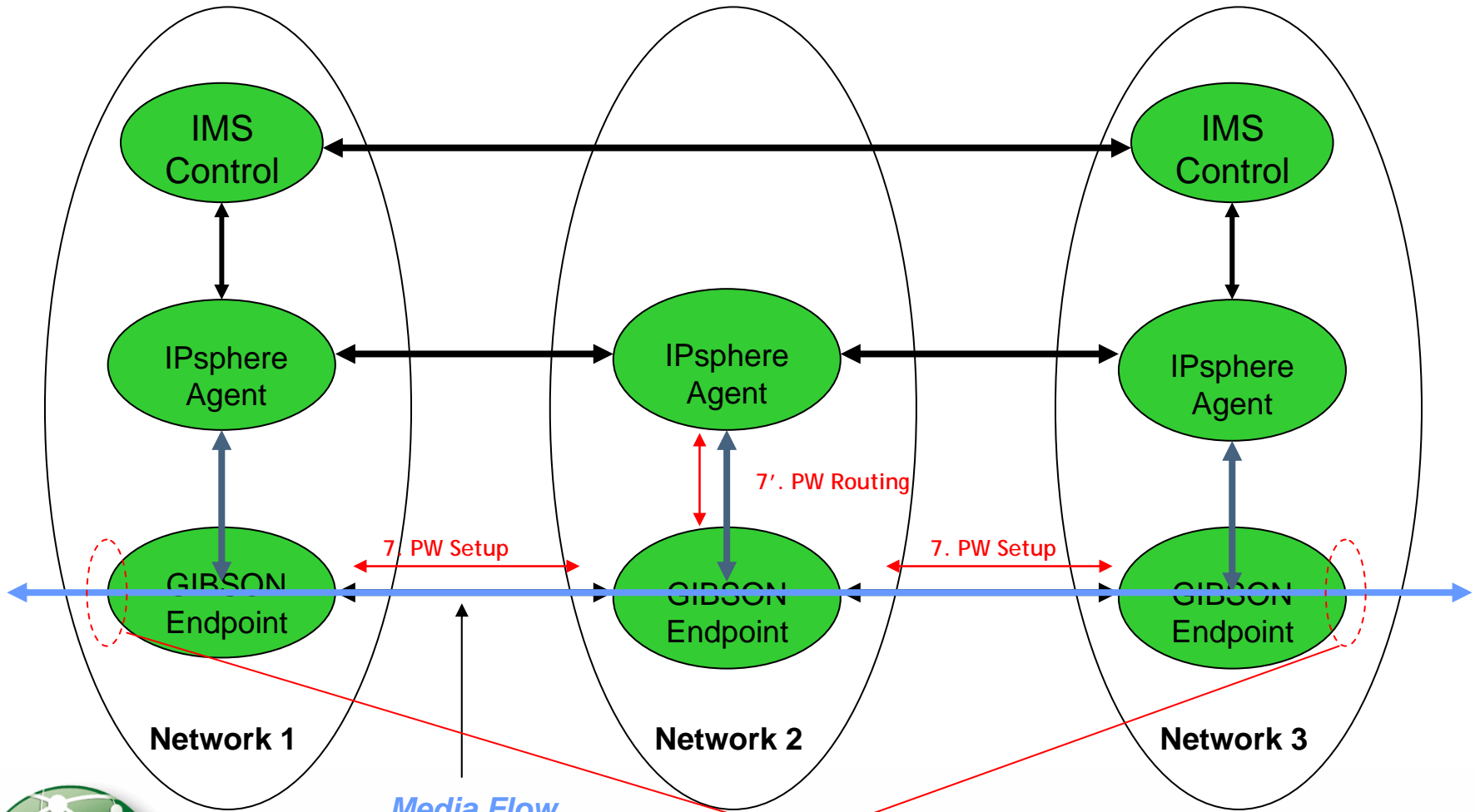THE BUSINESS OF IP

Interfaces in GIBSON
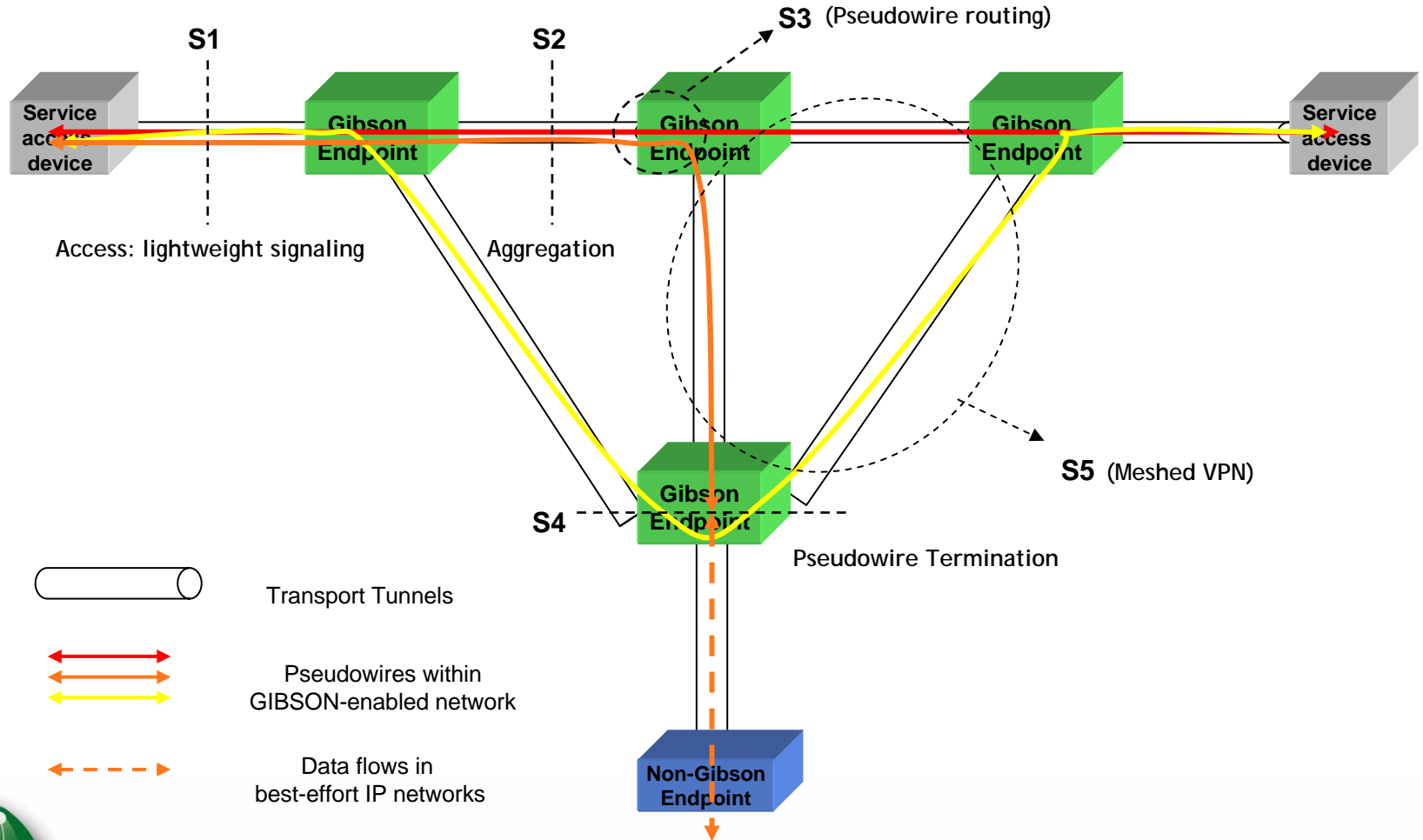
GIBSON: IMS User Case
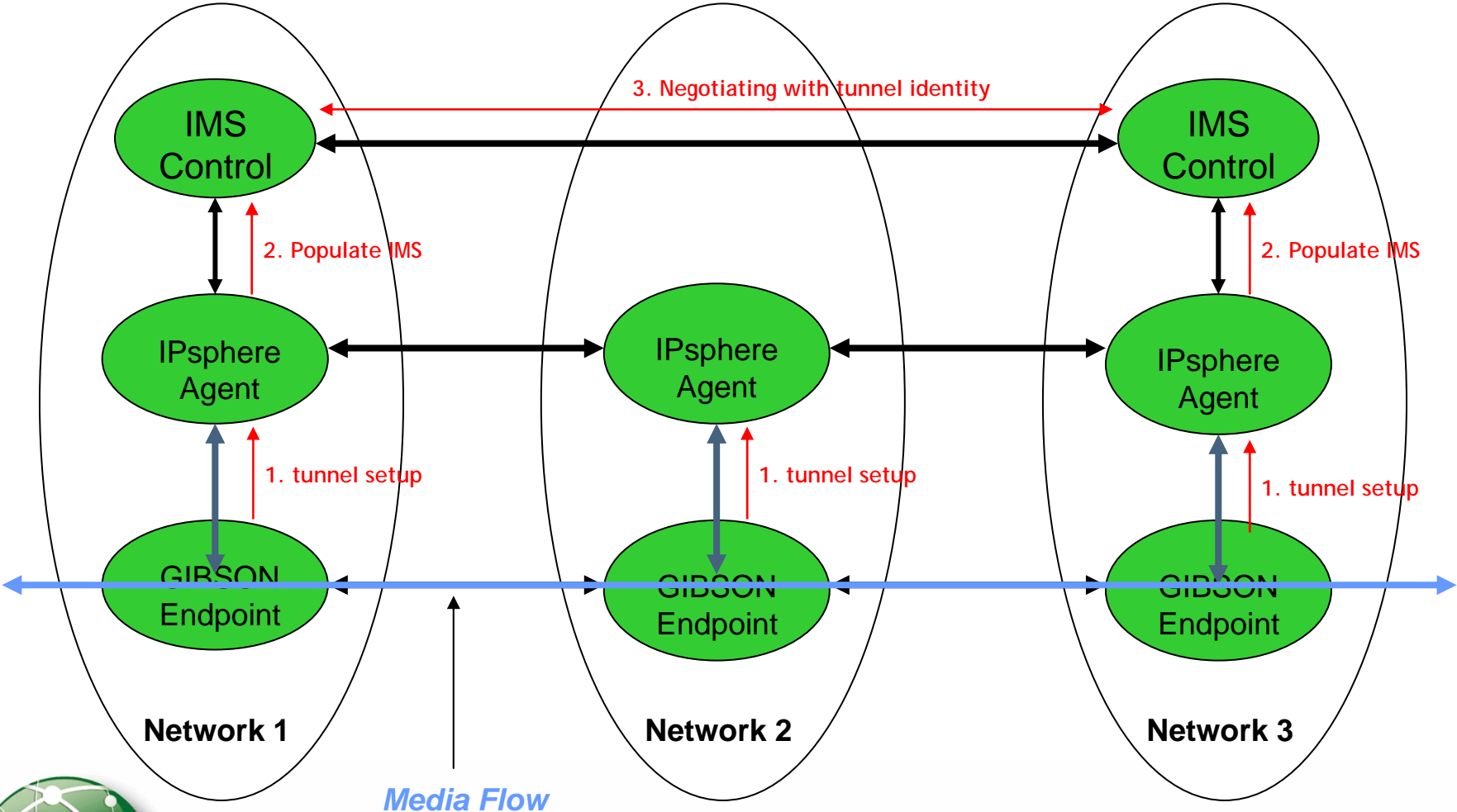
GIBSON: IMS User Case (cont. 1)

GIBSON: IMS User Case (cont. 2)

What's Next

- Extend the concept in other applications
  - Video-on-Demand
  - VPN
  - ...

- Demonstrate IMS functionality in the near future
  - For example, the year-end BT Showcase

- Complete the detailed mechanism work in IETF
  - A number of carriers and vendors are working together on
    - Dry-Martini
    - PW Protection
    - PW Congestion
    - MHOP PW Routing

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