

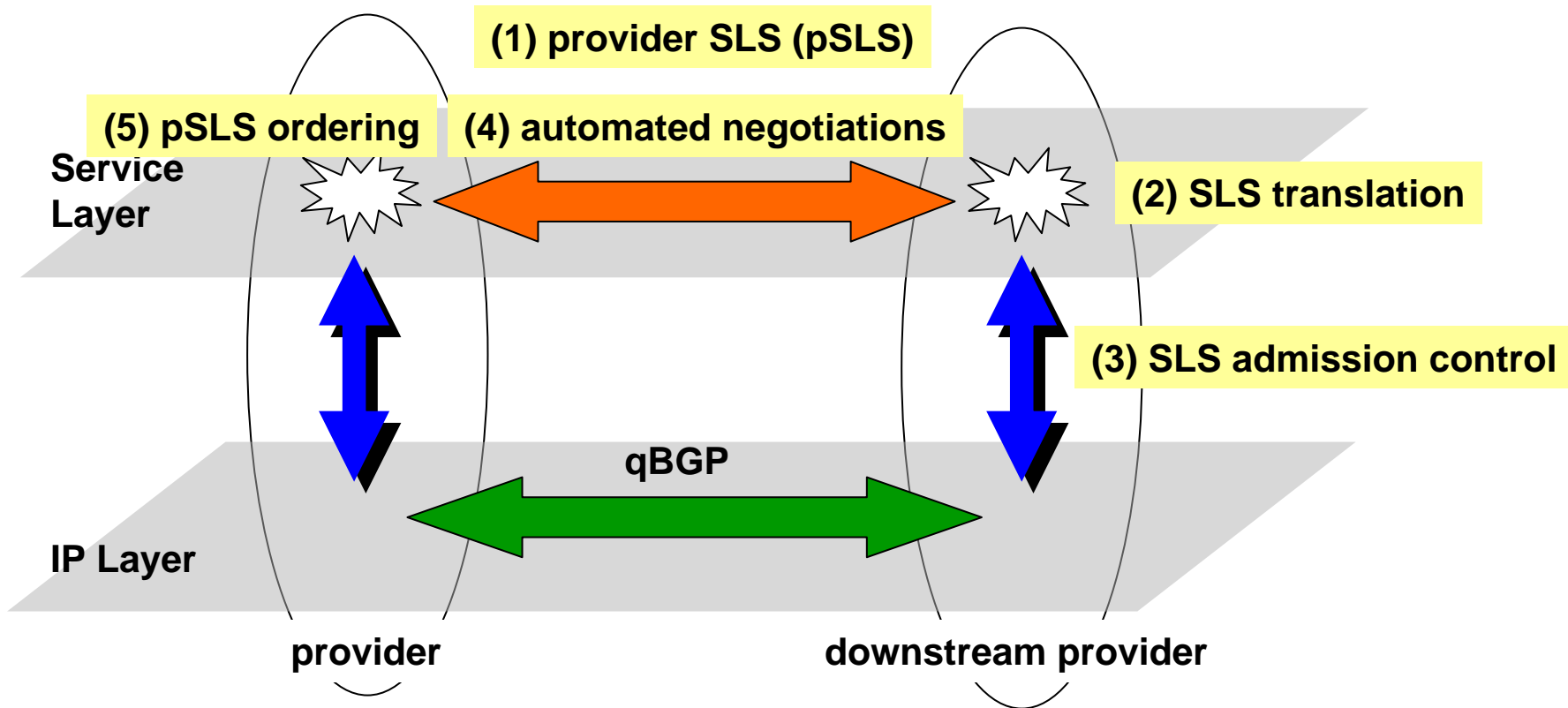


Agreements between providers for QoS services in the Internet: SLS Modelling, Negotiation and Admission Control

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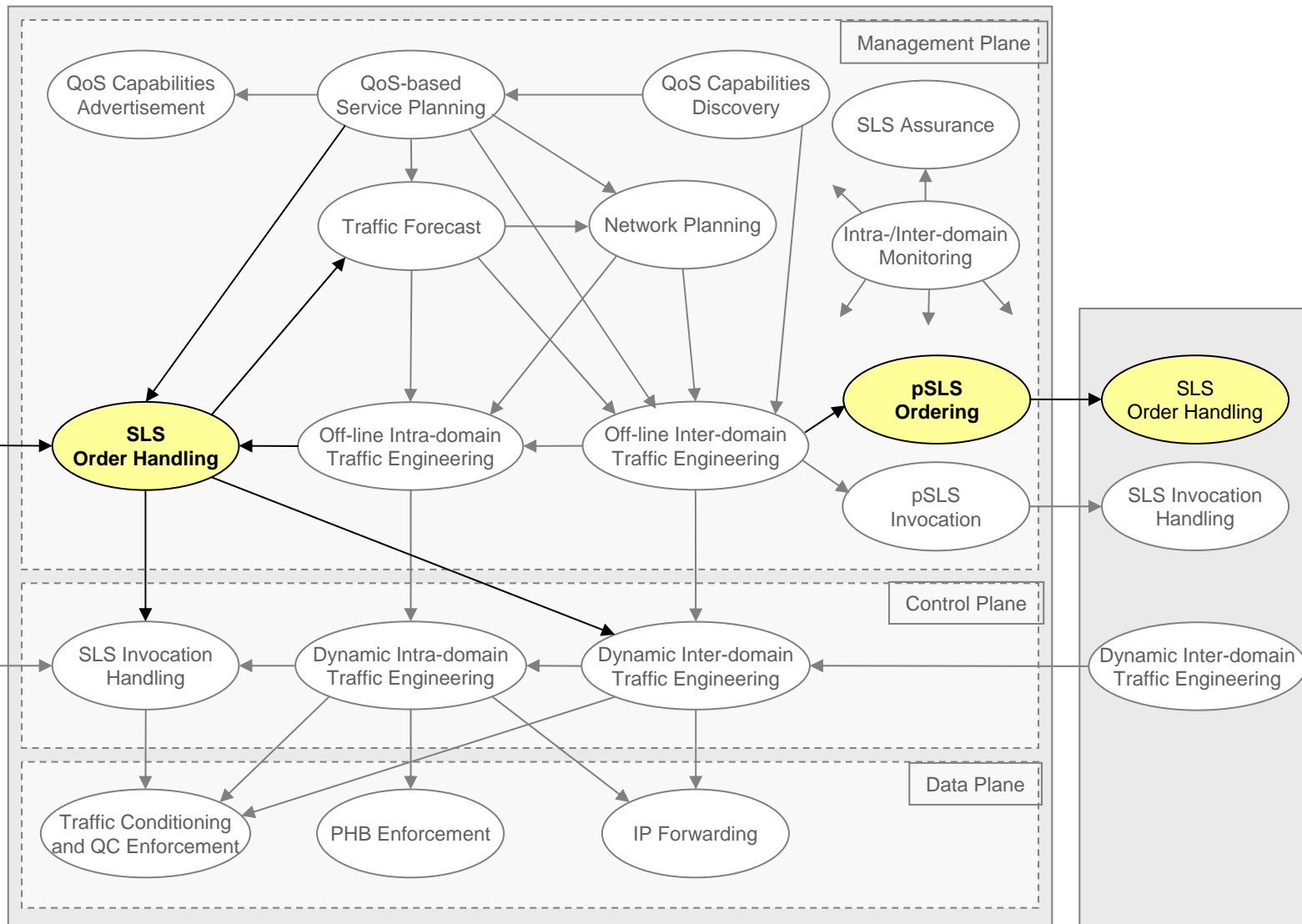


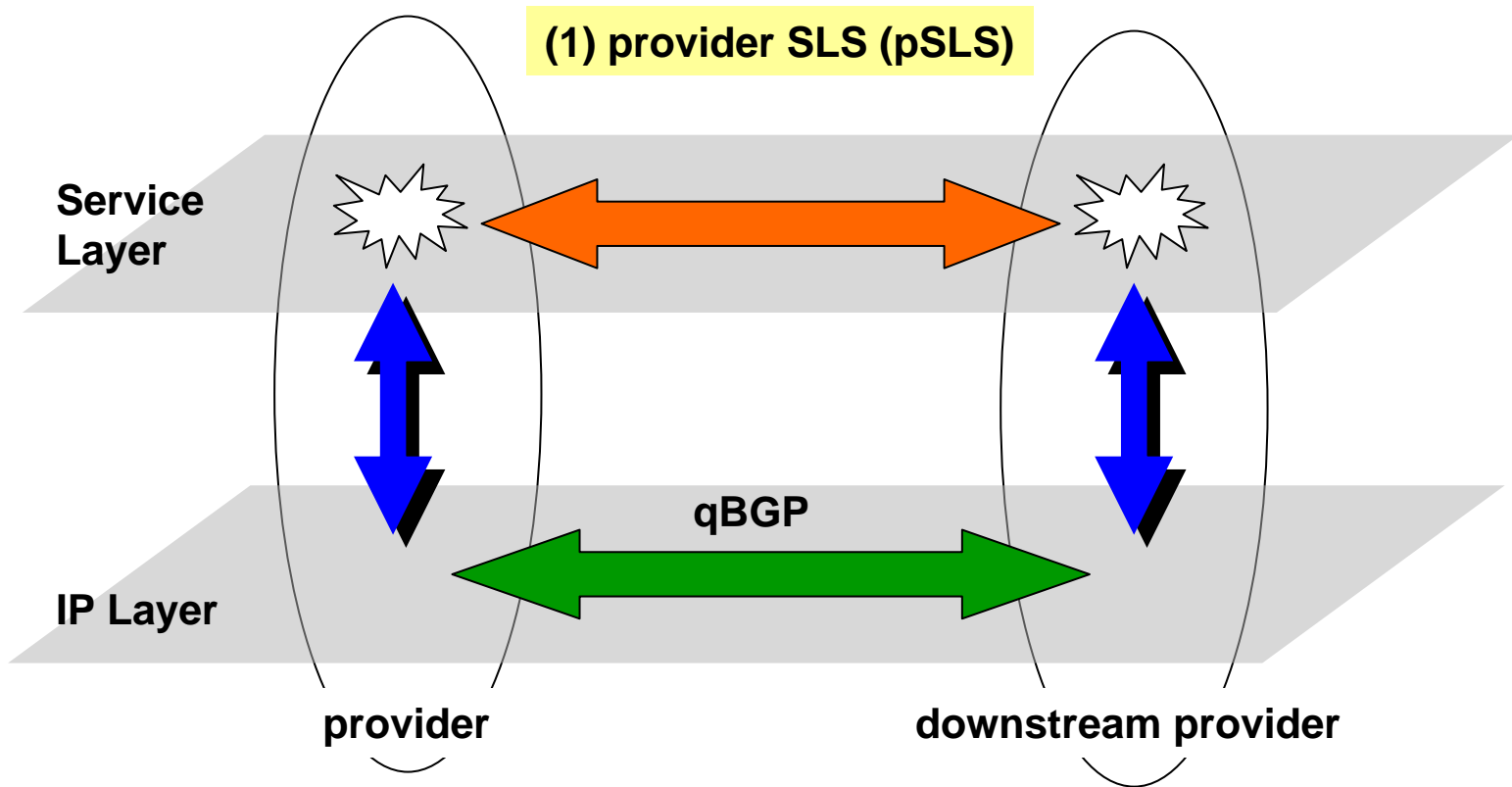
overview





positioning in MESCAL



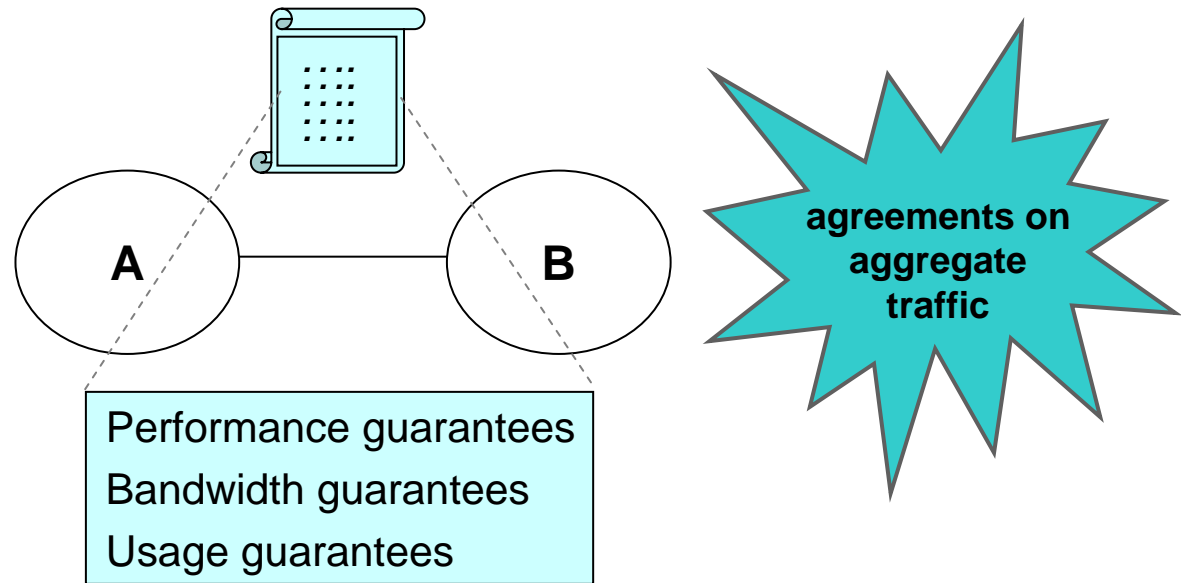




provider SLS definition

providers' Service Level Specifications – pSLSes

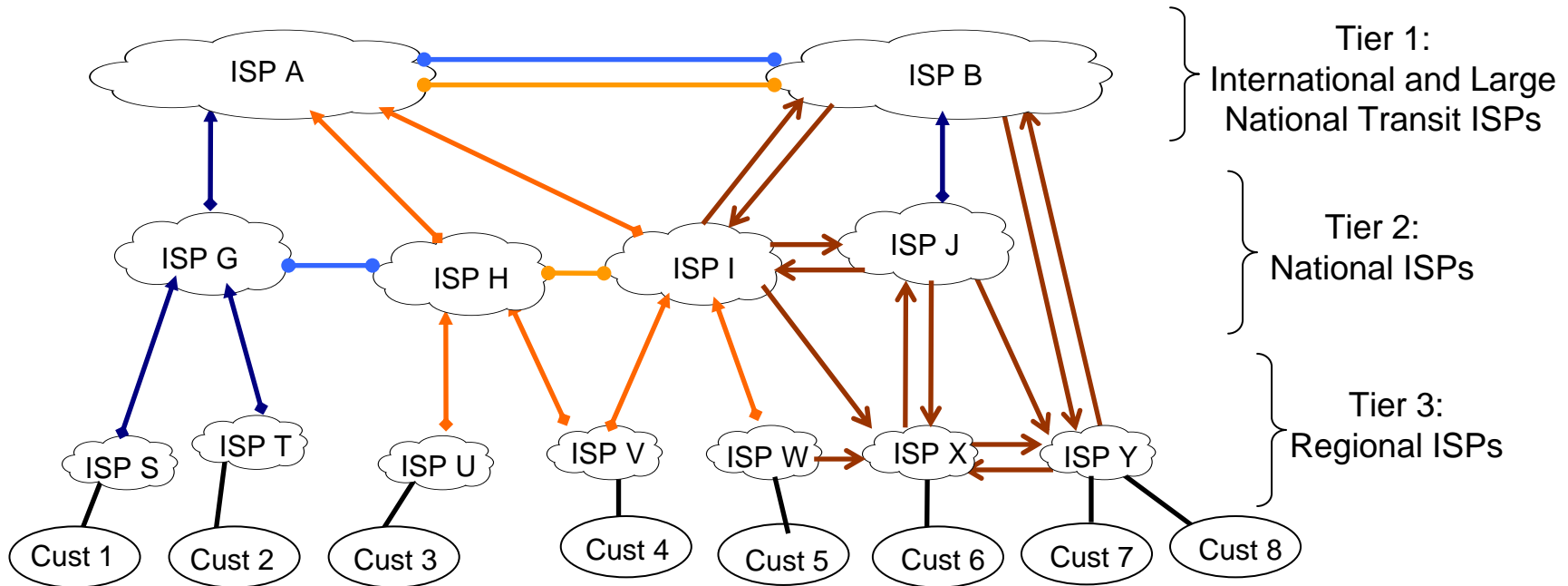
underlying agreements between ISPs for extending QoS reach in the Internet, provide clear definition of the QoS-based services offered by ISPs to other ISPs



***pSLS content and semantics
depend on the solution option and the business relationship between ISPs***



business model and pSLS types



customer/provider relationship :
Internet connectivity service by the provider ISP

peer-to-peer relationship :
Mutual agreement for traffic inter-exchange

QoS-enabled customer/provider relationship
Loose guarantees Internet connectivity or hard guarantees tunnel services

QoS-enabled peer-to-peer relationship
Loose guarantees Internet connectivity or hard guarantees tunnel services

QoS-enabled QoS-proxy relationship
Statistical quantitative guarantees Internet connectivity or hard guarantees tunnel services

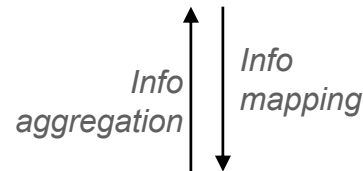
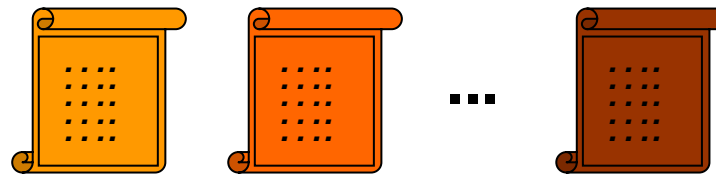


provider SLS modelling approach

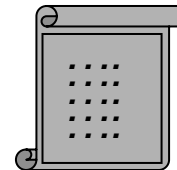
- Provide a common, 'well-known and understood', vocabulary to describe pSLS
 - Capturing the essential aspects and requirements of ISP agreements
 - Providing a basis for the service provisioning and TE functions

(focus is on connectivity aspects)

Summarized
models, specific per
pSLS type



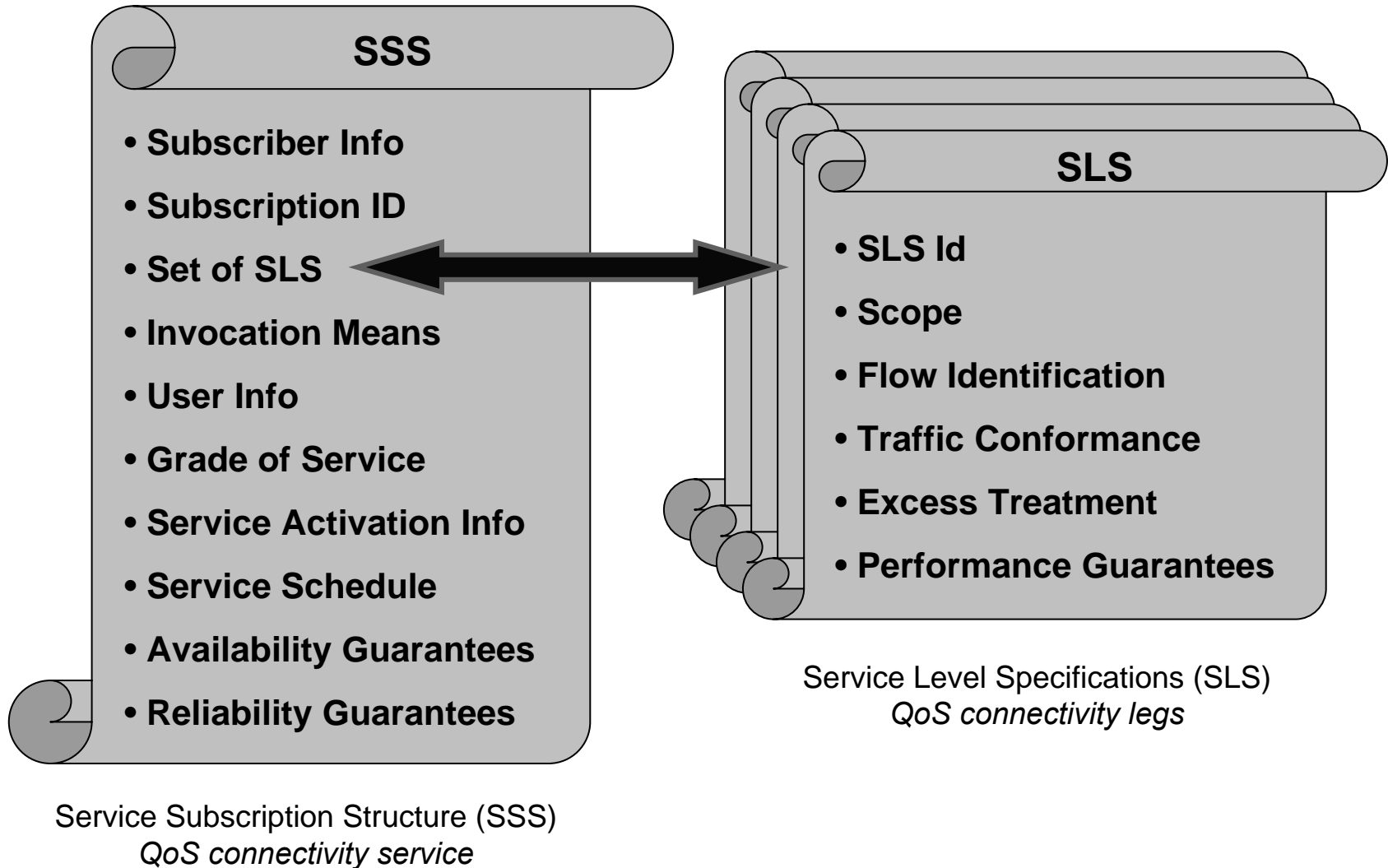
Open, general model for
pSLS and QoS-based
services in general

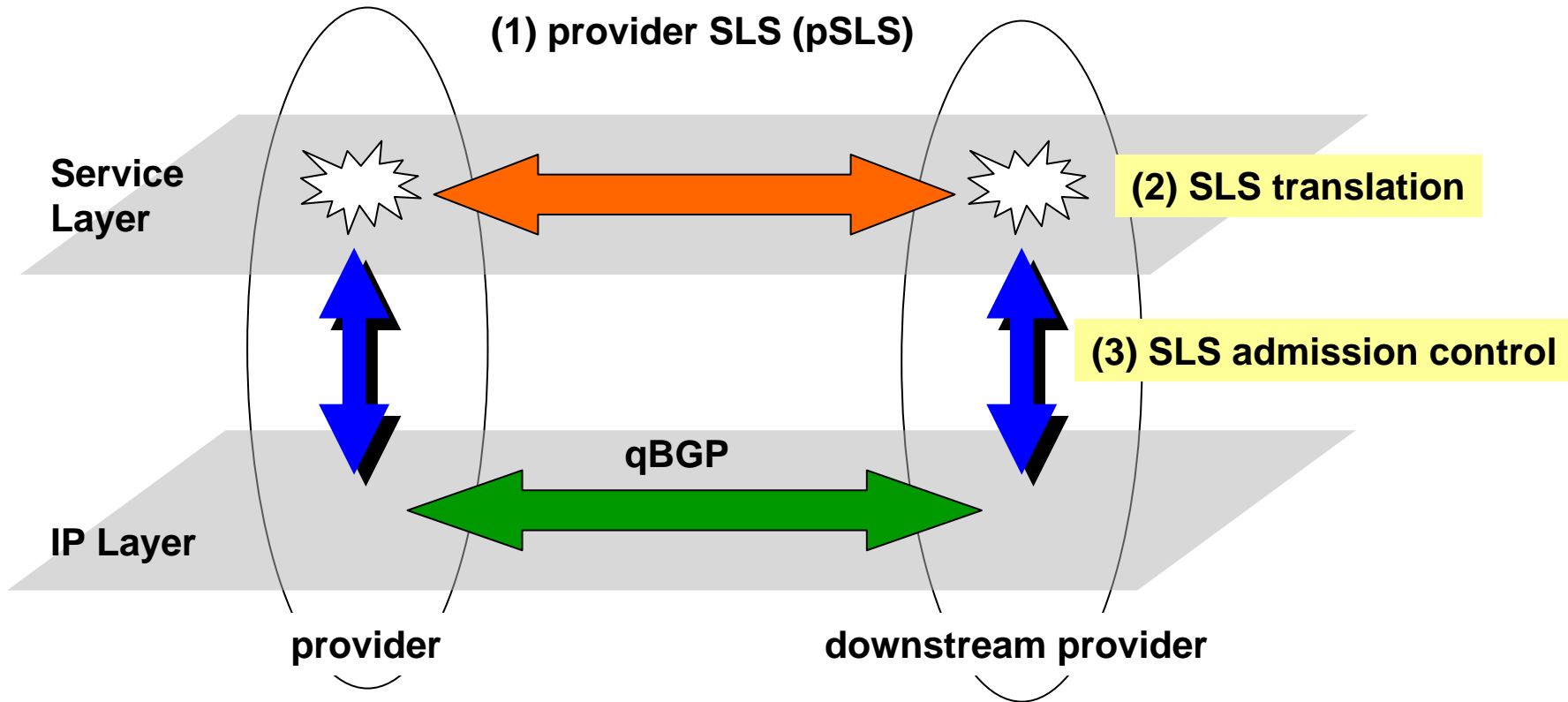




provider SLS

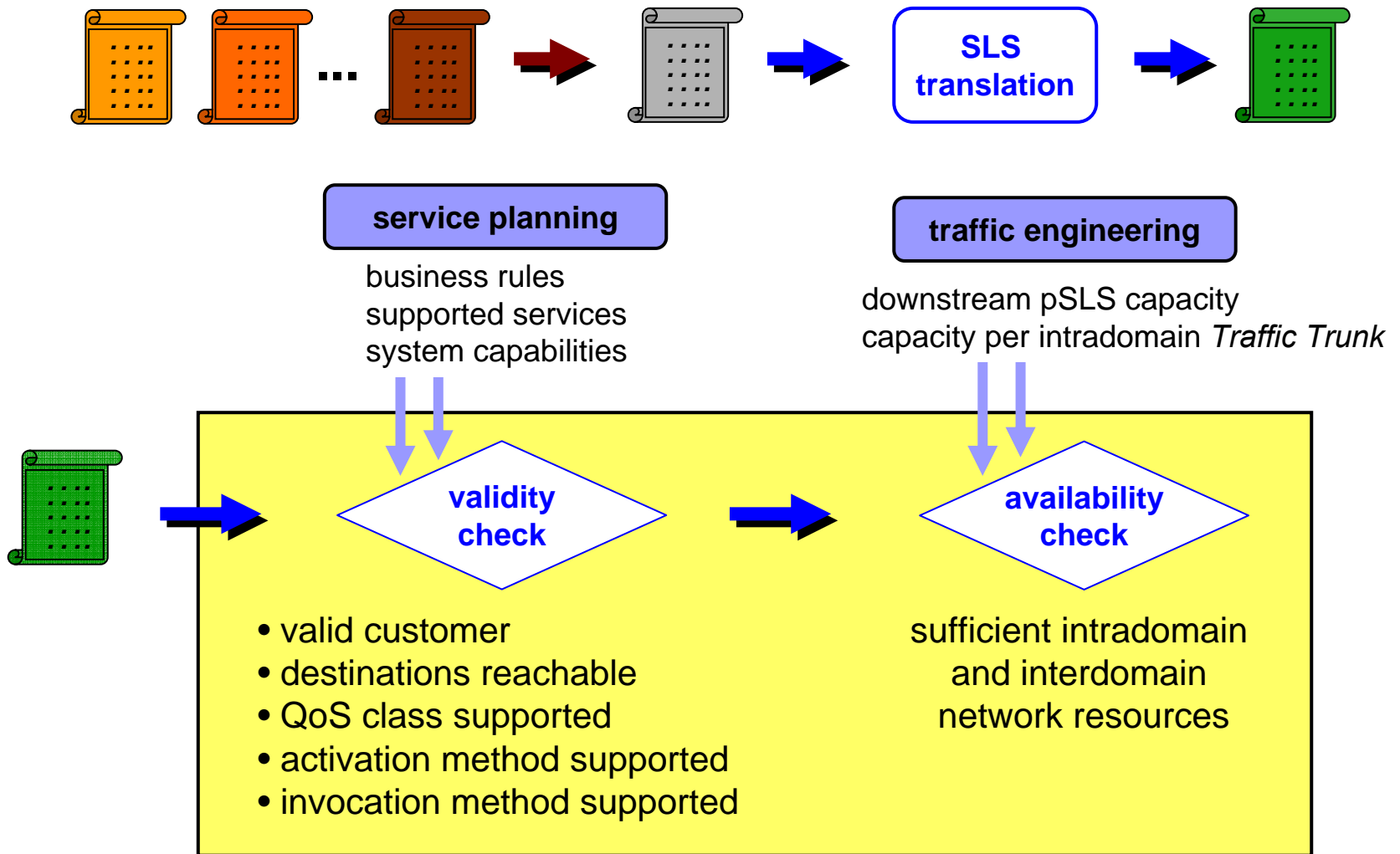
SLS general model







SLS admission control

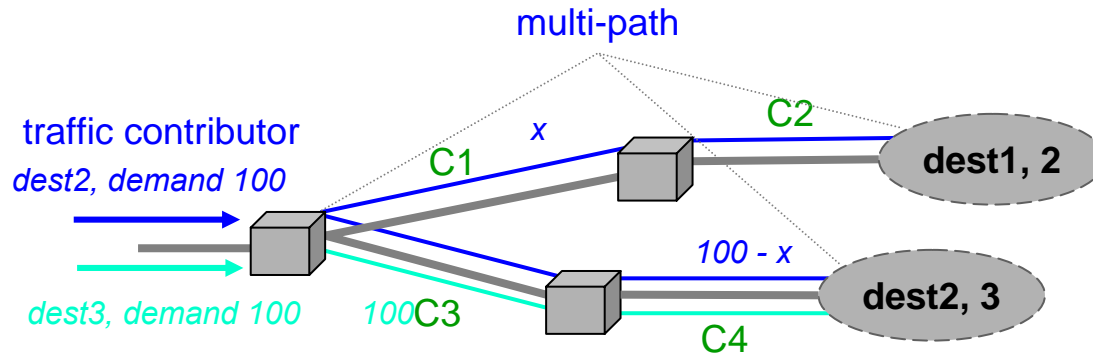
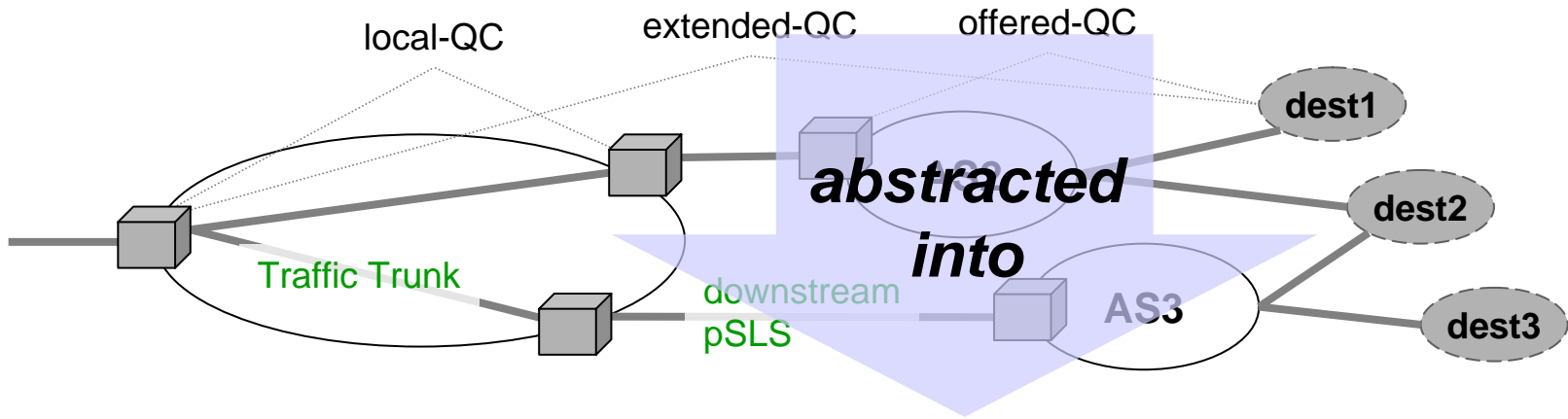




SLS admission control algorithm outline

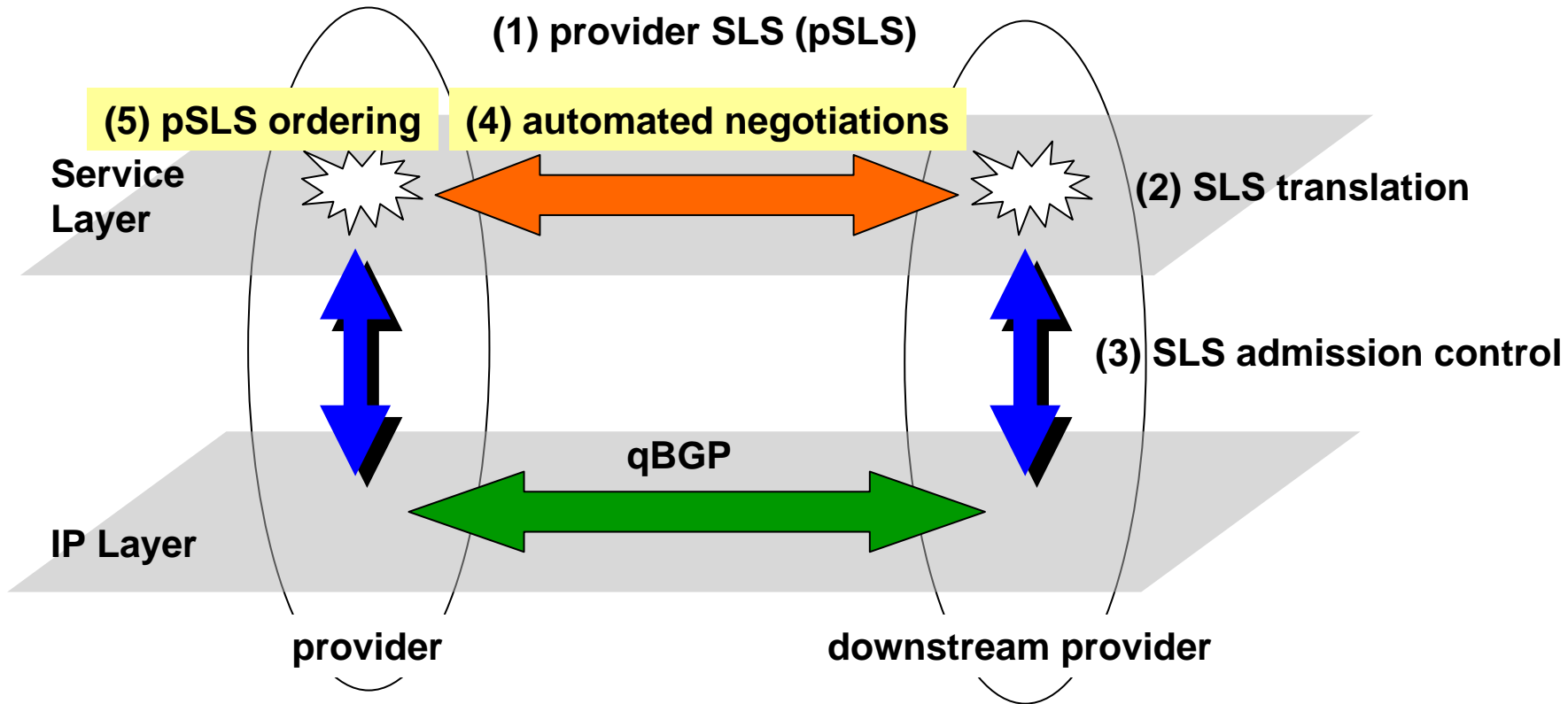
intradomain per internal Traffic Trunk : ingress ASBR, egress ASBR, local-QC, capacity

interdomain per downstream pSLS : egress ASBR, {destination IP Prefix}, offered-QC, capacity



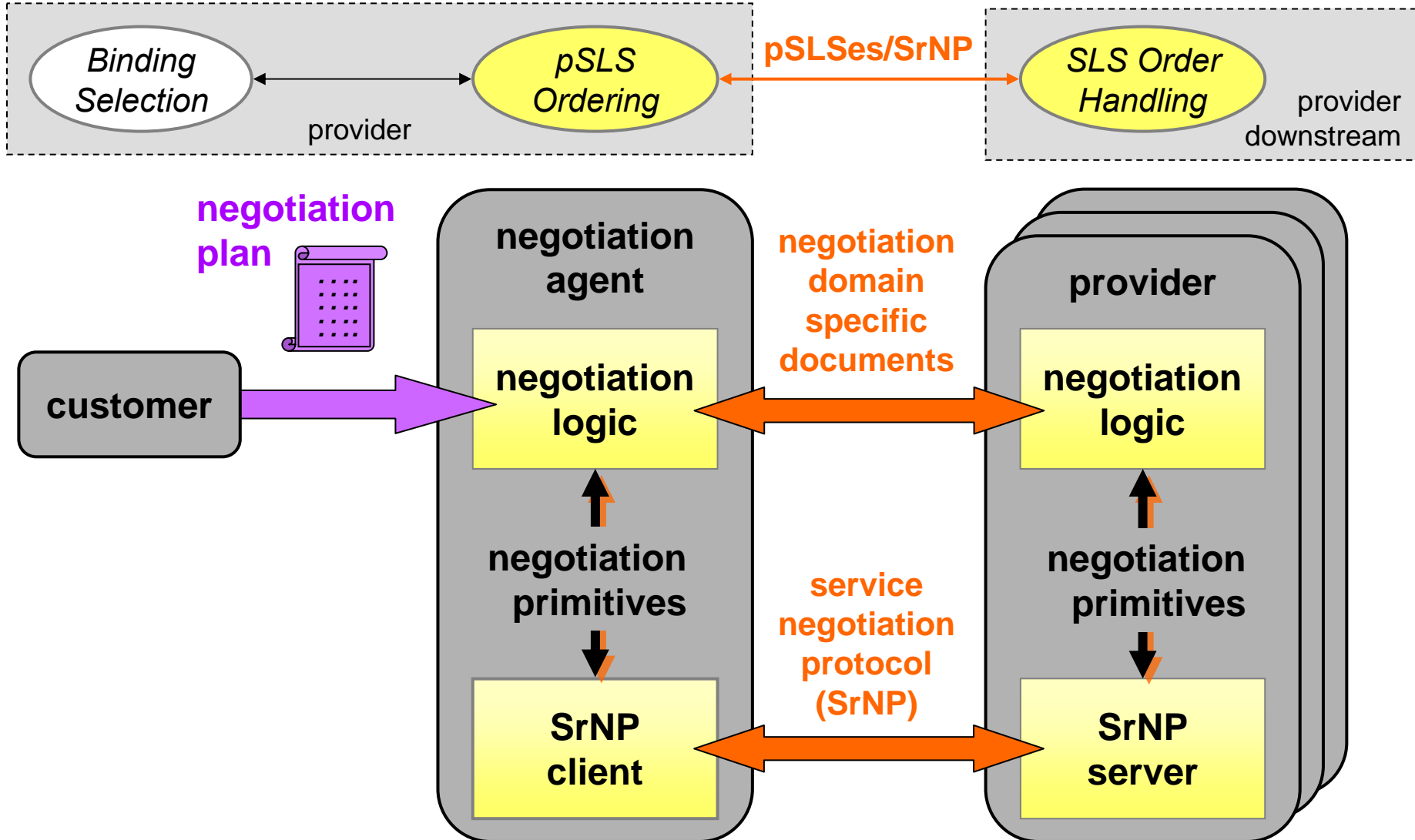
traffic contributor : ingress ASBR, {destination IP Prefix}, extended-QC, demand

multi-path : traffic contributor, {intradomain Traffic Trunk, downstream pSLS}





automated negotiations ordering and negotiation framework





automated negotiations

negotiation plan

Negotiation Target



An individual agreement to be pursued

- Issues under negotiation
- Target tolerance criteria

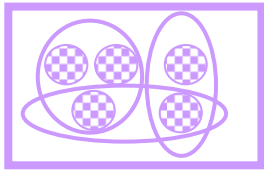
Negotiation Packet



A set of Targets to be pursued collectively (either all or none)

- Negotiation Targets
- Packet acceptance criteria

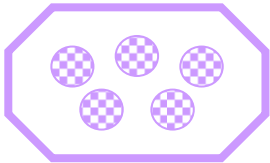
Negotiation Package



A collection of Packets to be pursued together for selecting the best one

- Negotiation Packets (may be overlapping)
- Packet selection criteria

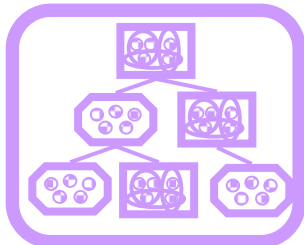
Negotiation Pool



A collection of Targets to be pursued together for selecting the best combination

- Negotiation Targets
- Combination acceptance criteria
- Combination selection criteria

Negotiation Plan



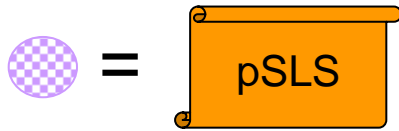
A collection of Packages and Pools (fail-over alternatives) to be pursued in a particular order:

- Negotiation Packages and Pools
- Transition criteria (negotiation road-map)



automated negotiations

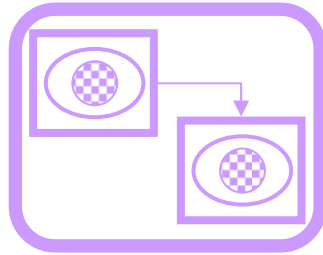
pSLS ordering example



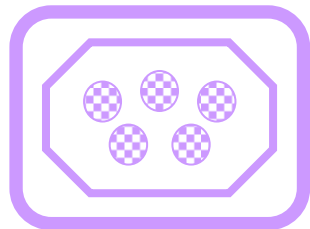
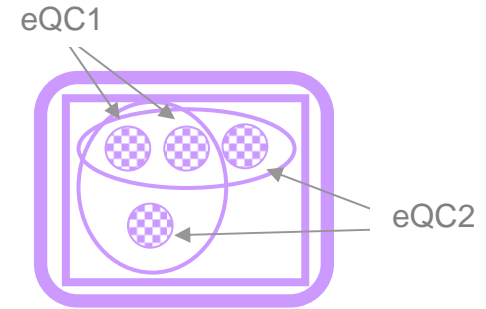
pSLS, the Negotiation Target

- bandwidth *negotiation issue*, tolerance criteria: $10 < \text{bandwidth} < 100$
- cost *negotiation issue*

Case 1: One eQC with one pSLS; if failed, with another pSLS



Case 2: eQC1 with two pSLSes together with eQC2 with one of two pSLSes



Case 3: One eQC, with a set of pSLSes, get the cheapest combination.

pSLS group, the Negotiation Pool

Combination Acceptance Criteria:

- $\sum \text{bandwidth} = 100$
- $\sum \text{cost} < 5.000$

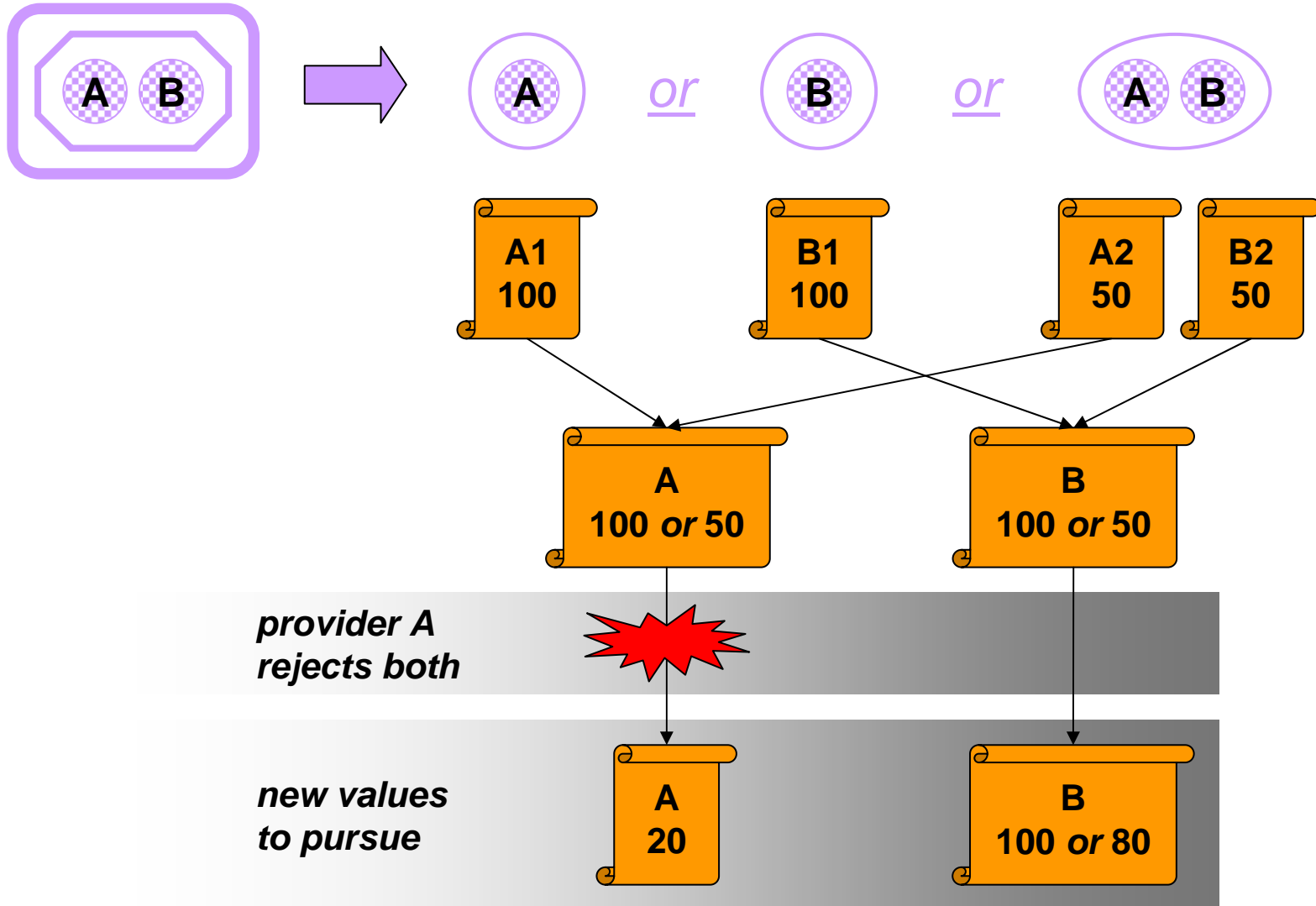
Combination Selection Criteria:

Minimise $\sum \text{cost}$



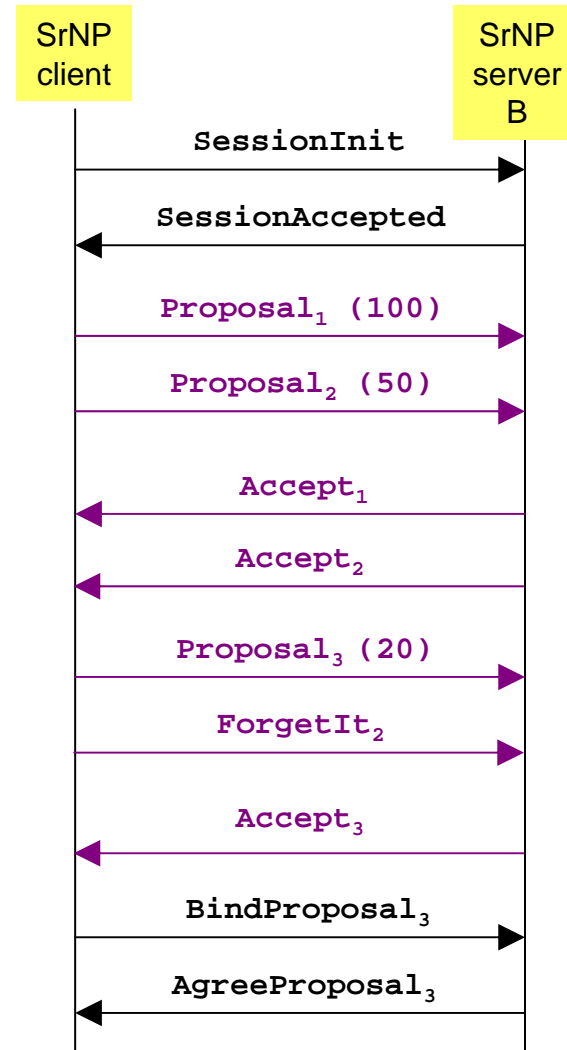
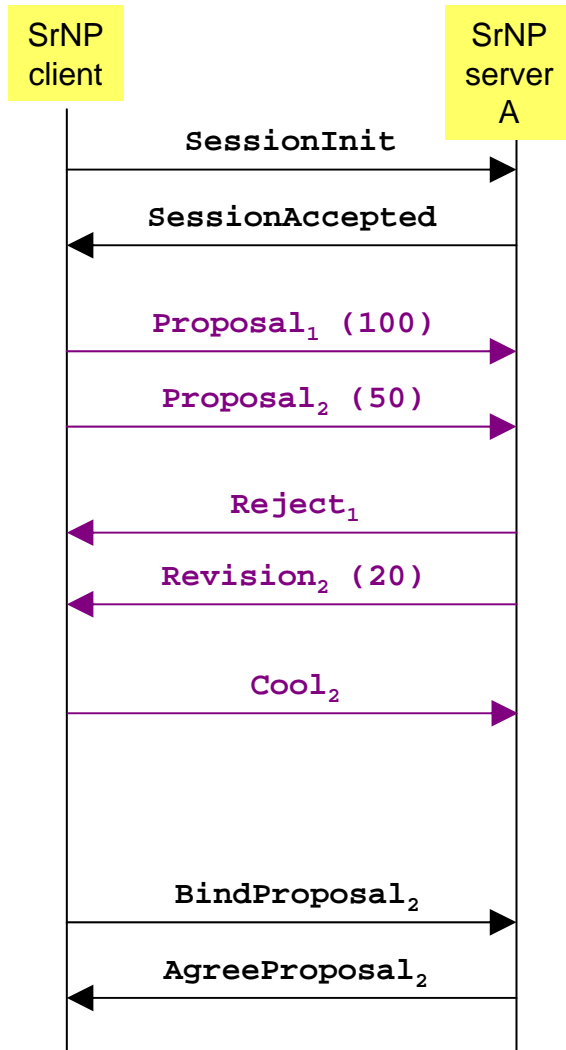
automated negotiations

service negotiation protocol requirements





SrNP example message sequence charts





- **Validation of the MESCAL service level interactions between providers and with traffic engineering functions**
- **Definition of pSLSes according to business relationships**
- **Powerful approach for QoS-based modelling**
- **Automated and tuneable mechanisms for service handling and provisioning from pSLS to qBGP configuration**
- **Flexible service negotiation protocol agnostic to the issues under negotiation**
- **Rich and expressive ordering language applicable to any commerce domain**

Towards efficient and automated service deployment and delivery across the Internet