

IETF – RTG WG Interim

<https://datatracker.ietf.org/meeting/interim-2022-rtgwg-01/session/rtgwg>

Architecture : What are the possible approaches & considerations?

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Semantic Routing & Architecture

Questions to ask:

1. What communication semantics are we aiming at?
2. What abstractions would we want?
3. How could an architecture look like? What are the main interactions?
4. What to consider for deployment?
5. What is the possible role for SDOs?

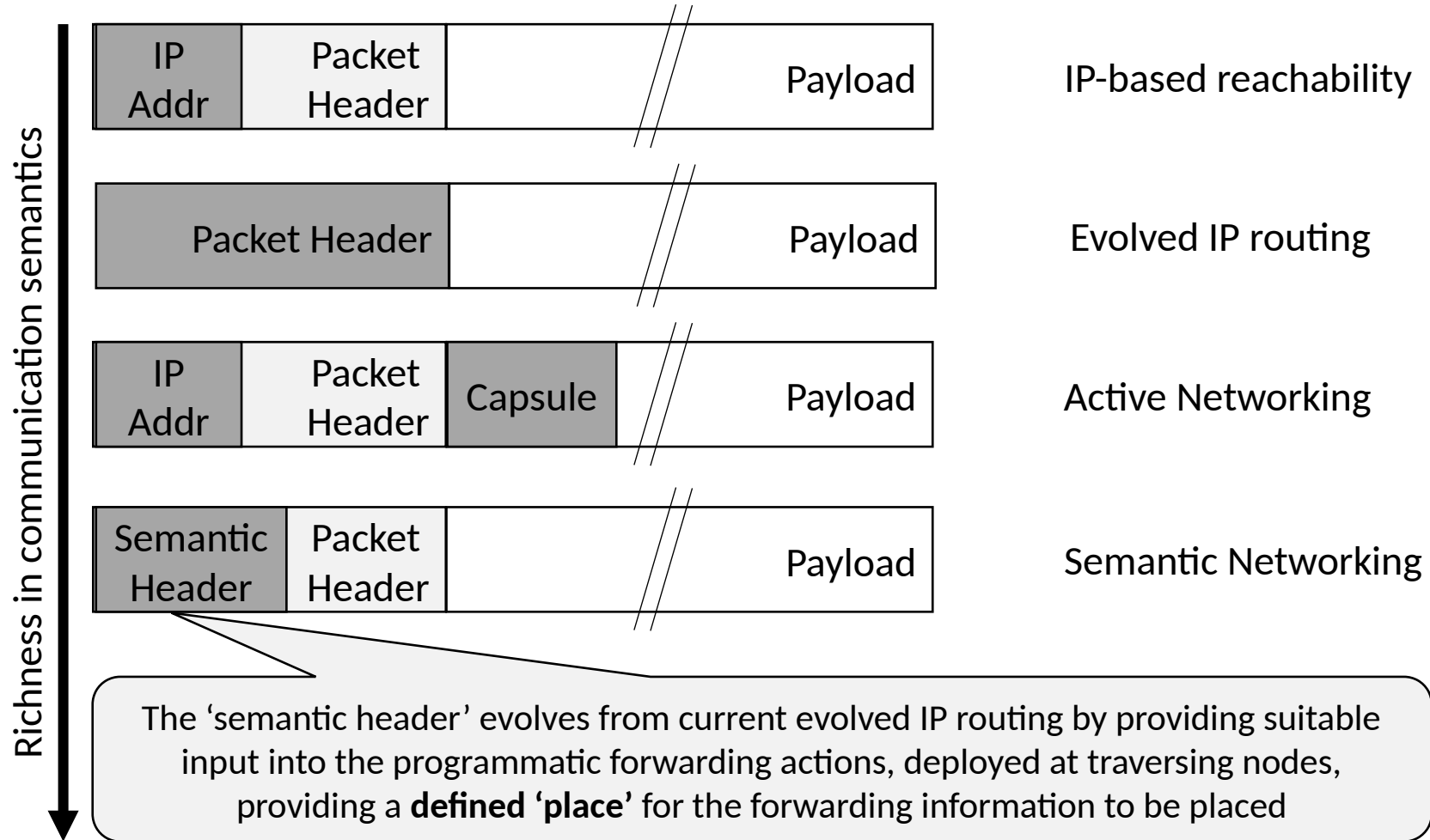
From The Original Purpose Of The Routing System...

- Network routing originally designed to enable forwarding of IP packets towards destination addresses in best-effort manner
- Locator semantic of IP addresses fundamental to this
 - Assigned in context of network topologies
- Distributed decision making in intermediary routers
- Key are methods for selecting path and criteria for doing so
- Traffic engineering may improve on just best effort through policy-based path steering & resource reservation

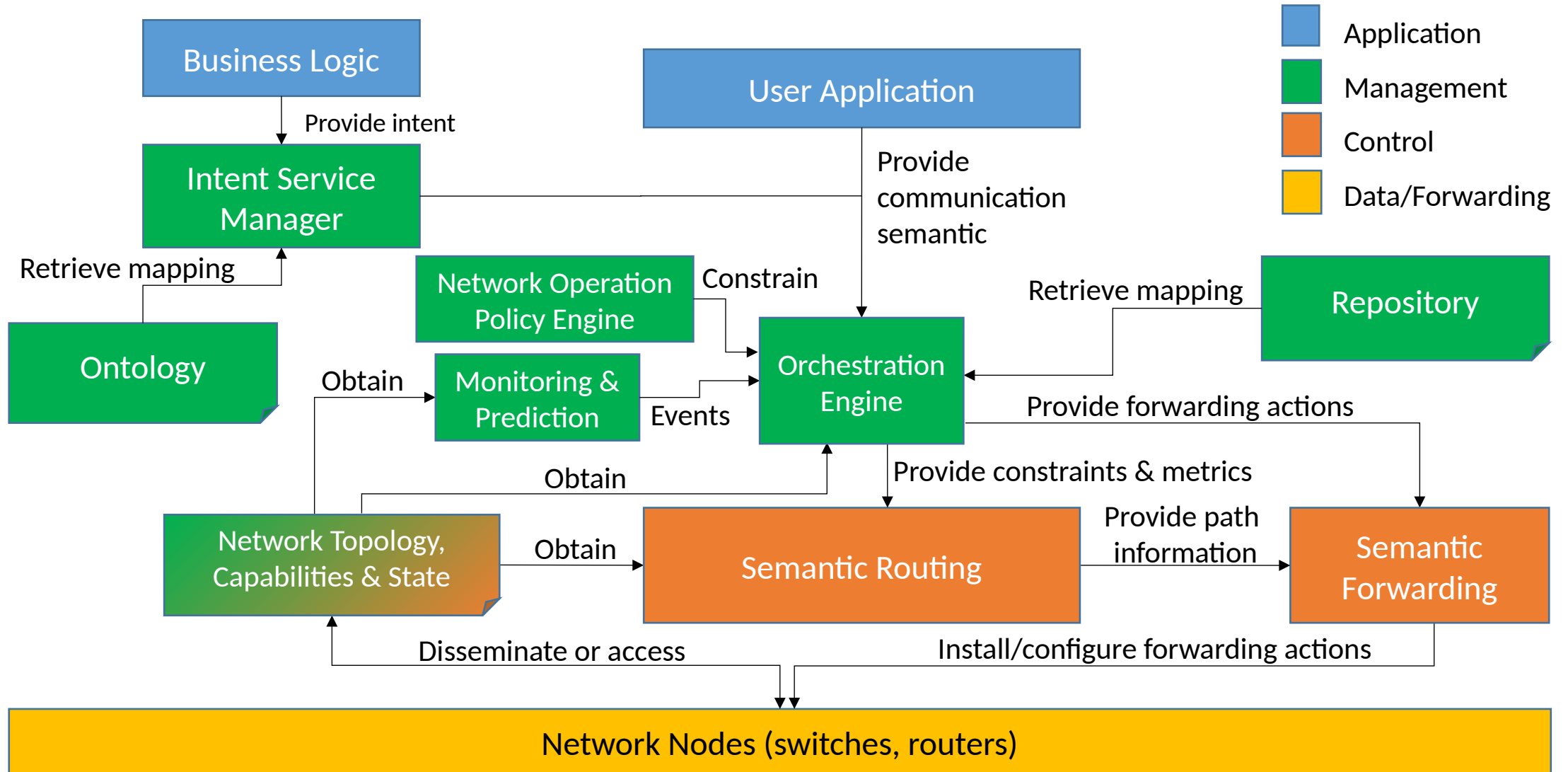
...Having Evolved to a System Supporting Rich Communication Semantics Beyond Just Best Effort Reachability

Endpoint(s) Selection Point	„Endpoint“ Relation	Endpoint(s) & Path Selection Criteria
Source	Unicast	Shortest path
Network		Multi-optimality
Source	Multicast	Group-based
Source+Sink		Diffusion-based
Network		<u>Forward Request Return Multicast (FRRM)</u>
Source	Anycast	Random
Network		Multi-optimality
		Scheduled
Source	Chaincast	Programmed
Network		Per hop

What Abstractions Would We Want?



How Could an Architecture Look Like?



Deployment Considerations

- **Overlay or Underlay or Inlay?**
 - Impact on technical choice, e.g.,
 - Use of Extension Headers instead of messing with IP addresses
 - Further segregating existing address space with new semantics (and actions)
 - Routing protocol impact, i.e., integration with existing routing protocols vs overlay routing protocol
- **Ship-in-the-night** to reconcile possibly desired speed of rollout with stability of existing system
 - Impact on technical choice, e.g., answer to overlay vs underlay vs inlay
- **Limited domain** technology or multi-domain?
 - How to ensure interconnection?
 - How to avoid spilling (domain-limited semantics and actions) into other domains?
- Capability to deliver **new services**
 - Programmatic way of doing so?
- **Manage networks** and their increasing complexity
 - Possible to move towards programmatic execution and management?
 - Insights from Semantic Web and similar areas?
- Answers to those considerations may be driven by economic incentives, e.g.,
 - Rollout speed and scope, e.g., positioning as multi-AS service offering atop IPv6
 - Removing burden to change underlay
 - Stability of existing services, therefore business

Possible Aspects for Standardization

- **(Extensible) Architectural framework**

- Components, interfaces and interactions need to be interoperable

- **Semantics**

- Not use cases for but the purpose of communication!
- Possibly captured as a service description to enable programmatic realization?

- **Abstractions**

- Evolving addressing as the main input into actions (of routing and forwarding)
- Encodings and encapsulations

- **Actions**

- State distributions (aka routing protocols), configuration protocols, ...
- Network programming (e.g., the primitives)