

Progetto ACINO

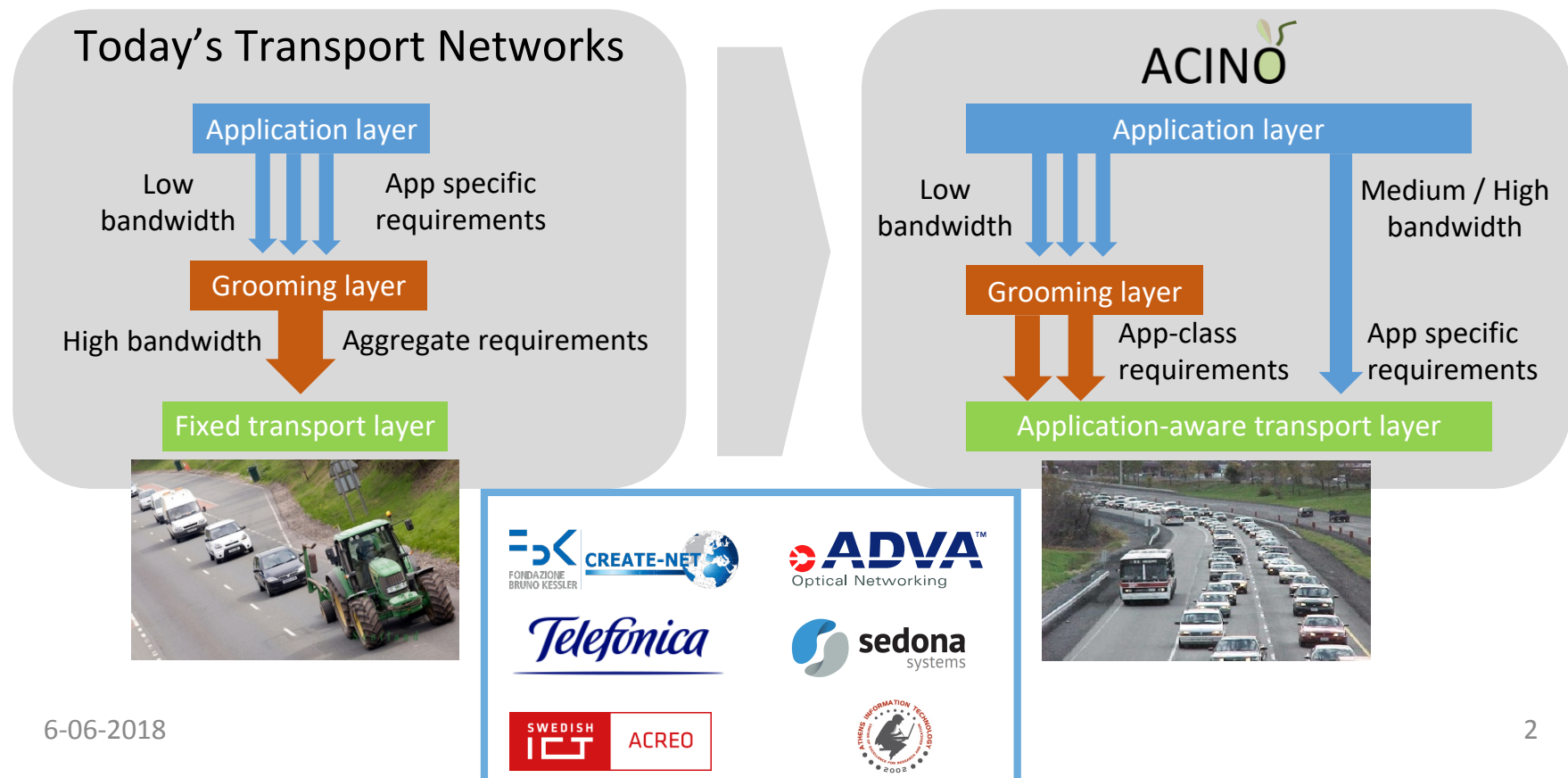
Application-Centric IP/Optical Network Orchestration

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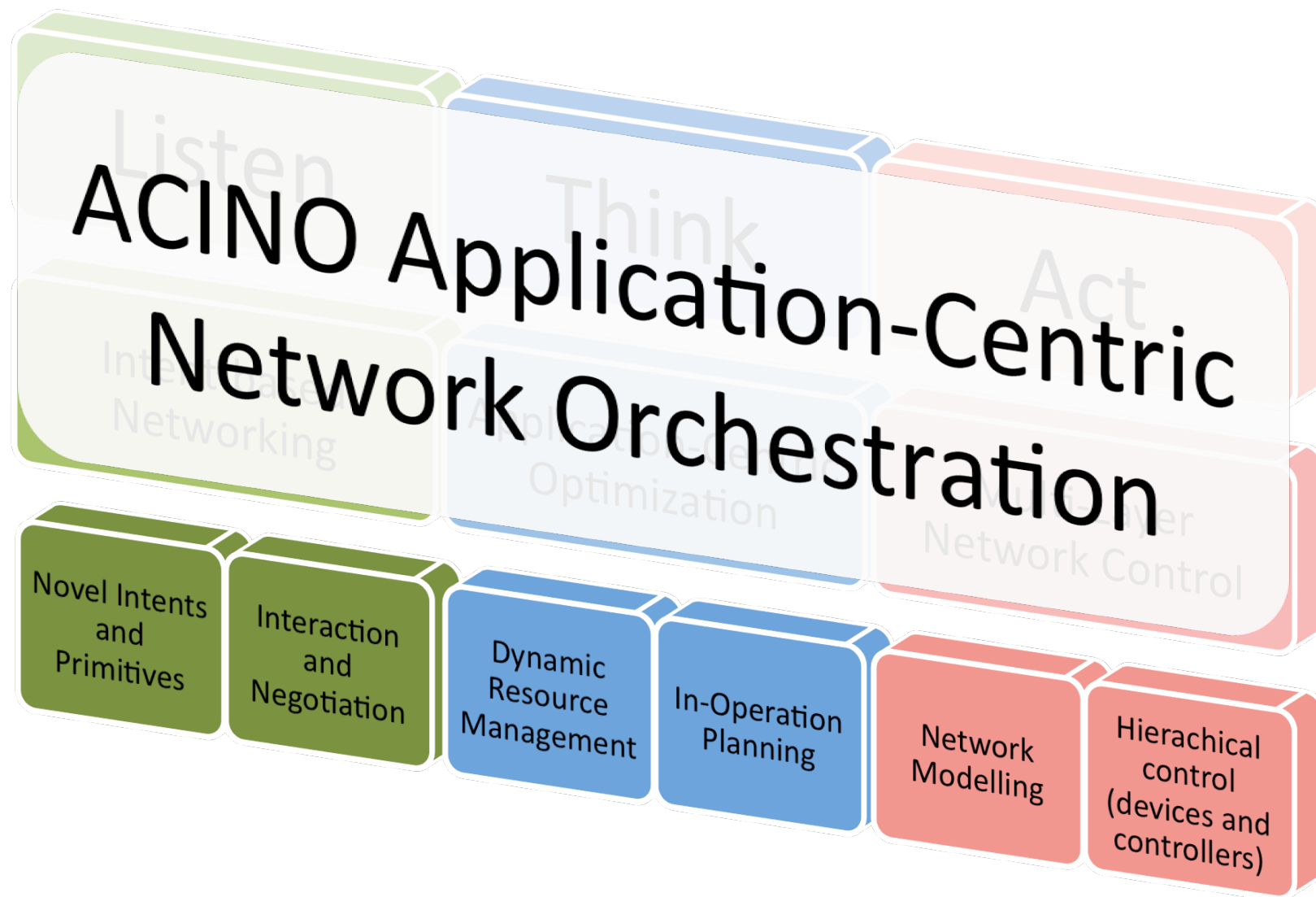
Workshop GARR 2018
Rome, May 30th 2018

Application-centric concept

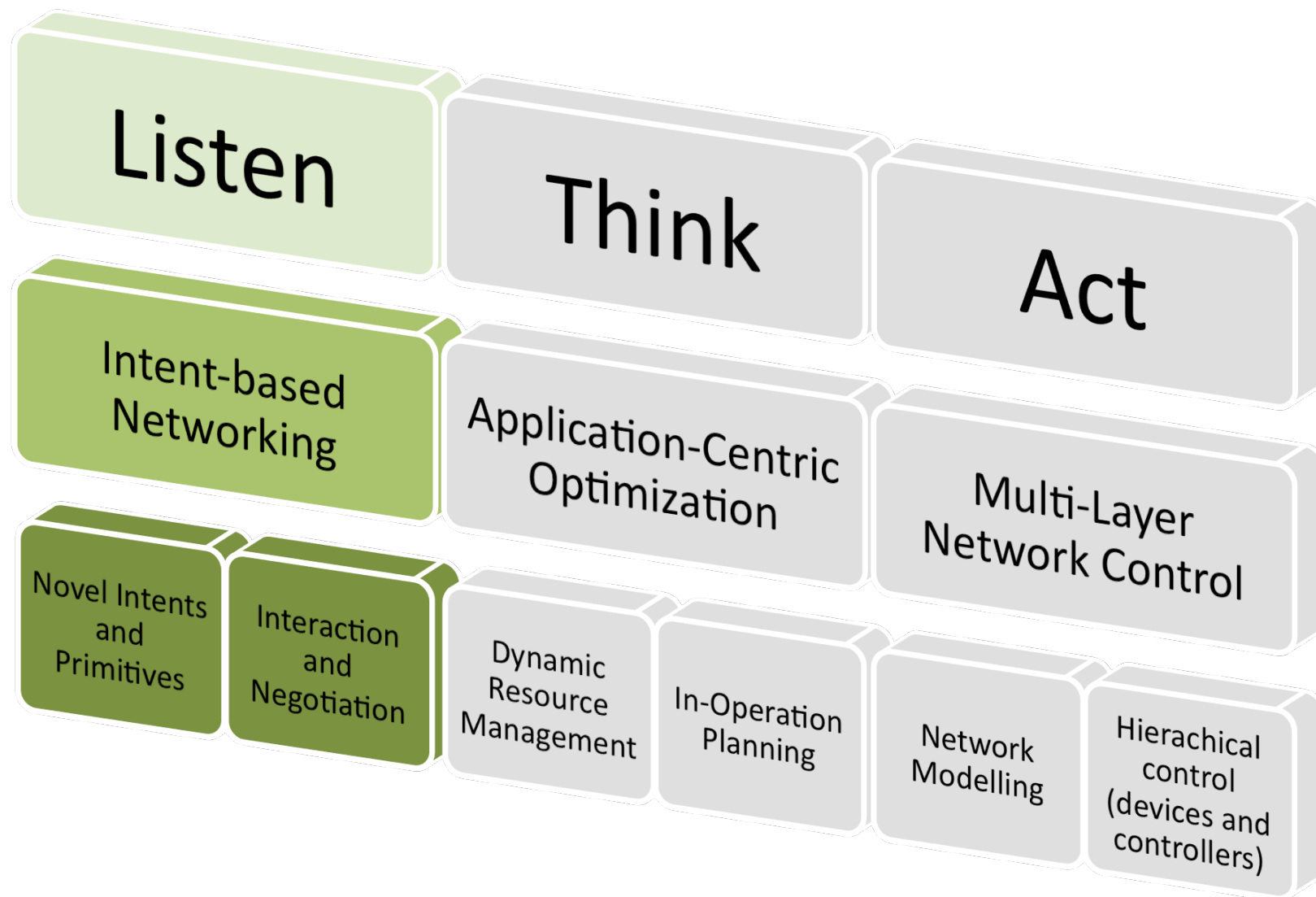
Overcome inaccurate mapping between applications' needs and the service they receive by ***differentiating the service offered to each application at each layer of the transport network, so to adapt the network to the needs of the applications***



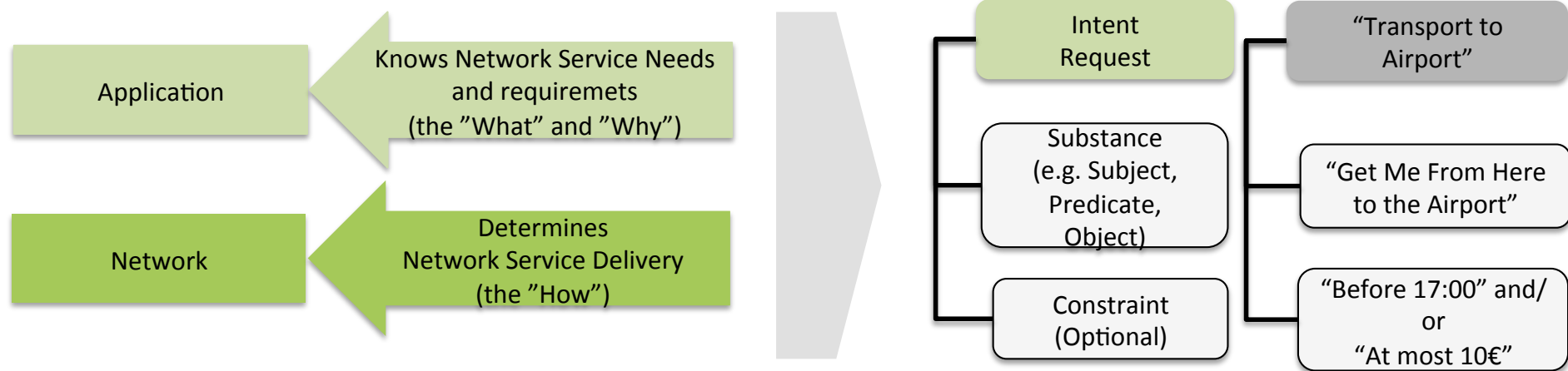
Technical Pillars



Listen to apps' needs

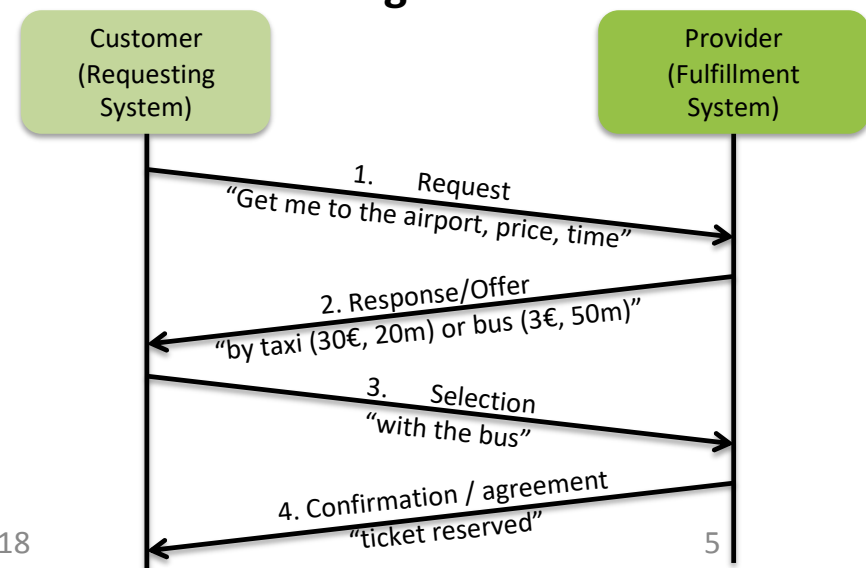
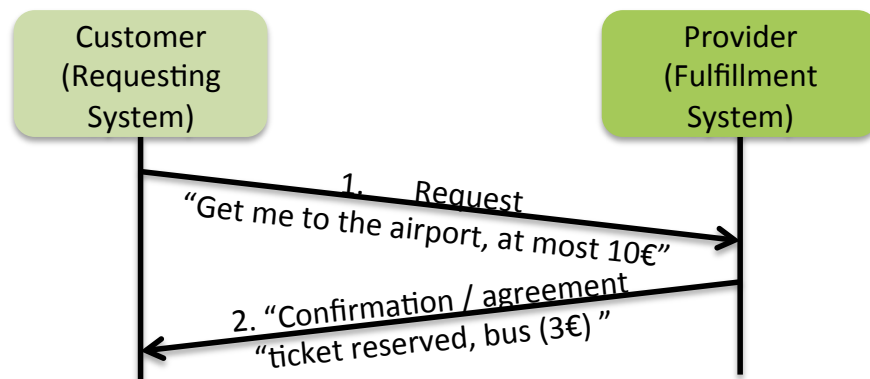


Intent-based Networking



Provide a service

Negotiate

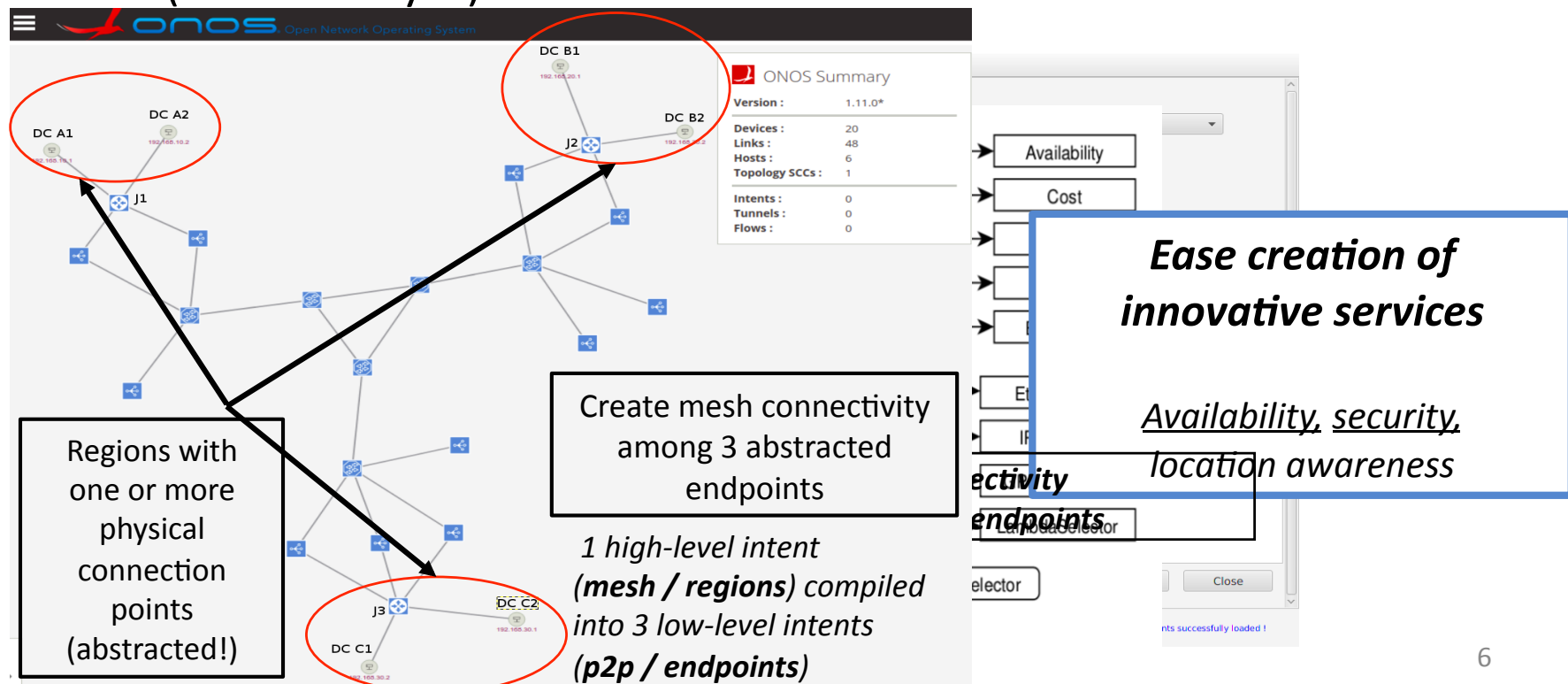


Intent-based interface: DISMI

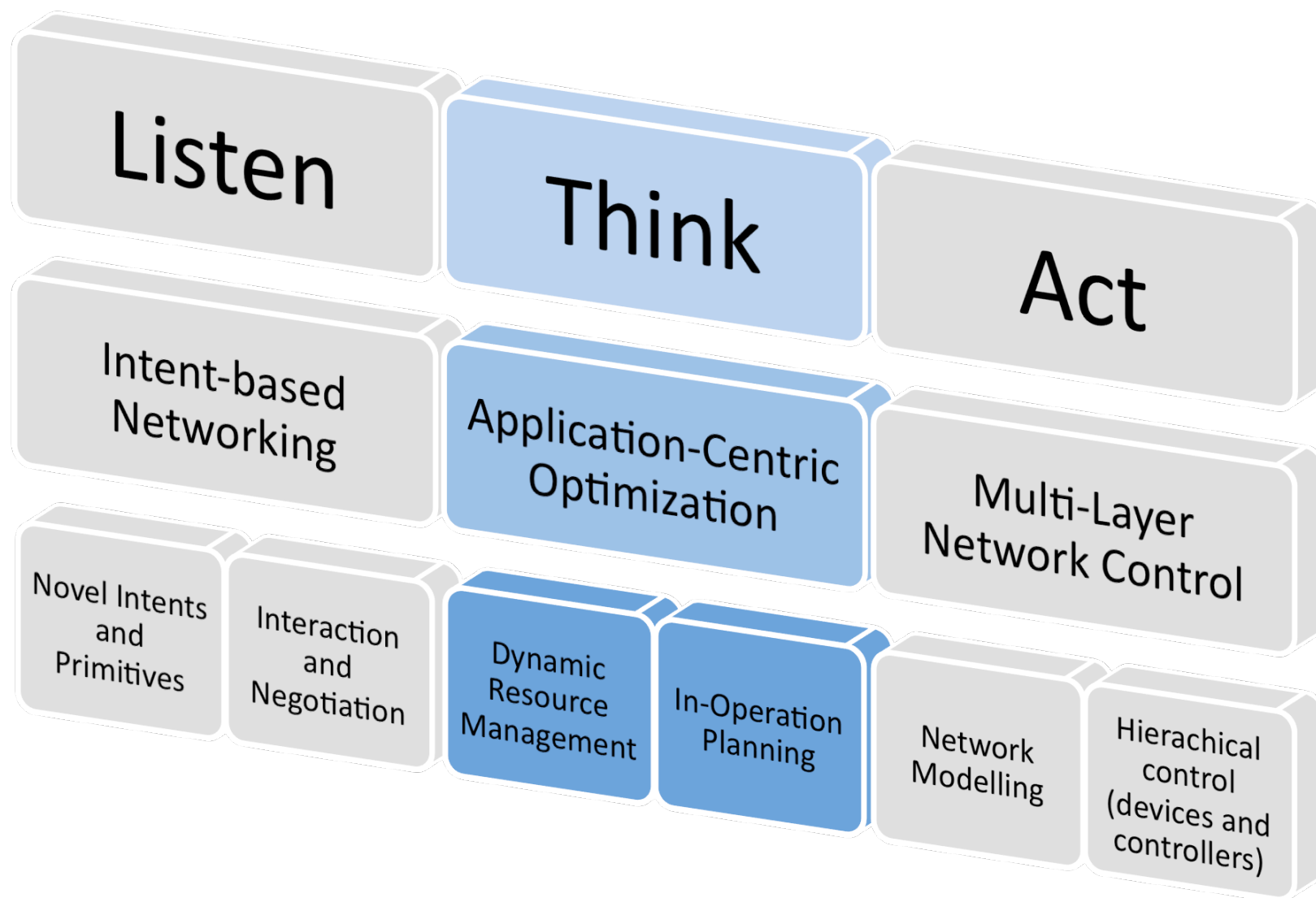
Dynamic Intent-driven Service Management Interface

- **Grammar** defines how primitives can be combined to express an intent (verb, nouns, modifiers, etc.)

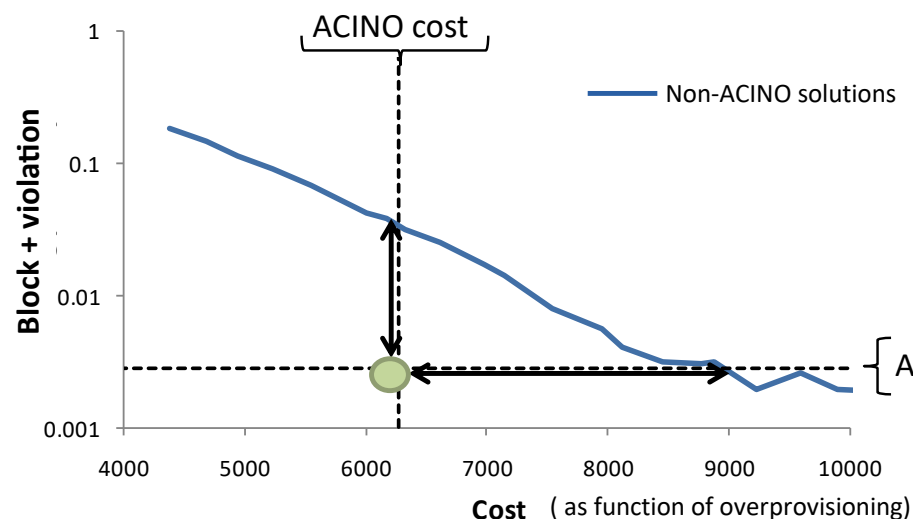
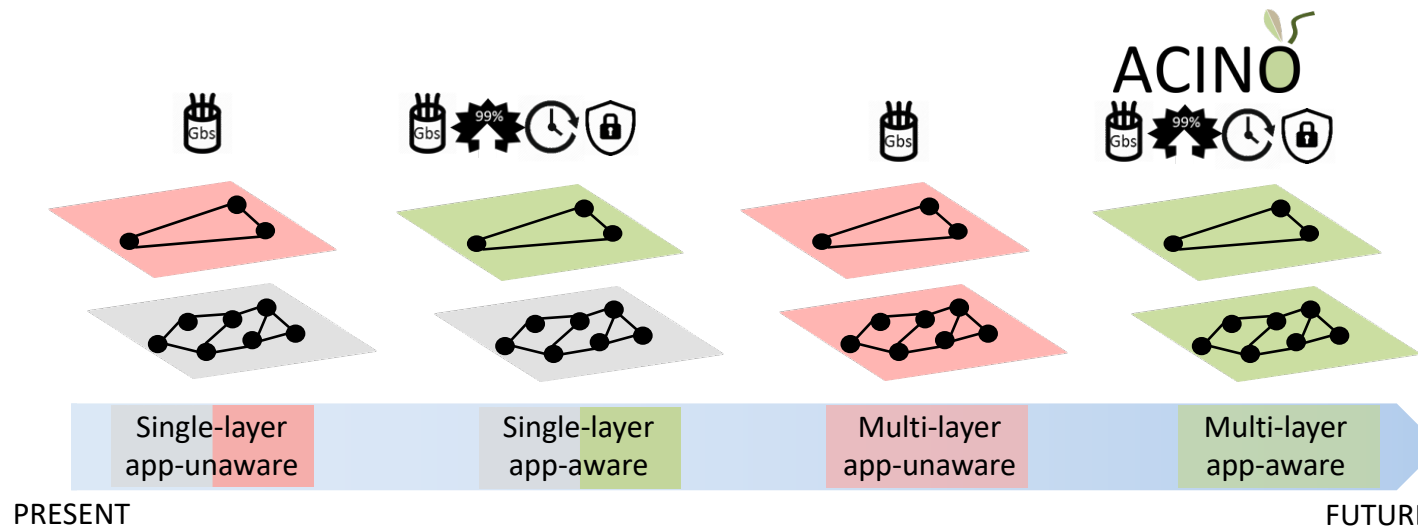
DISMI **validates** and **compiles** complex high-level intents into low-level intents (network layer)



Deliver app-centric optimization



App-centric Optimization

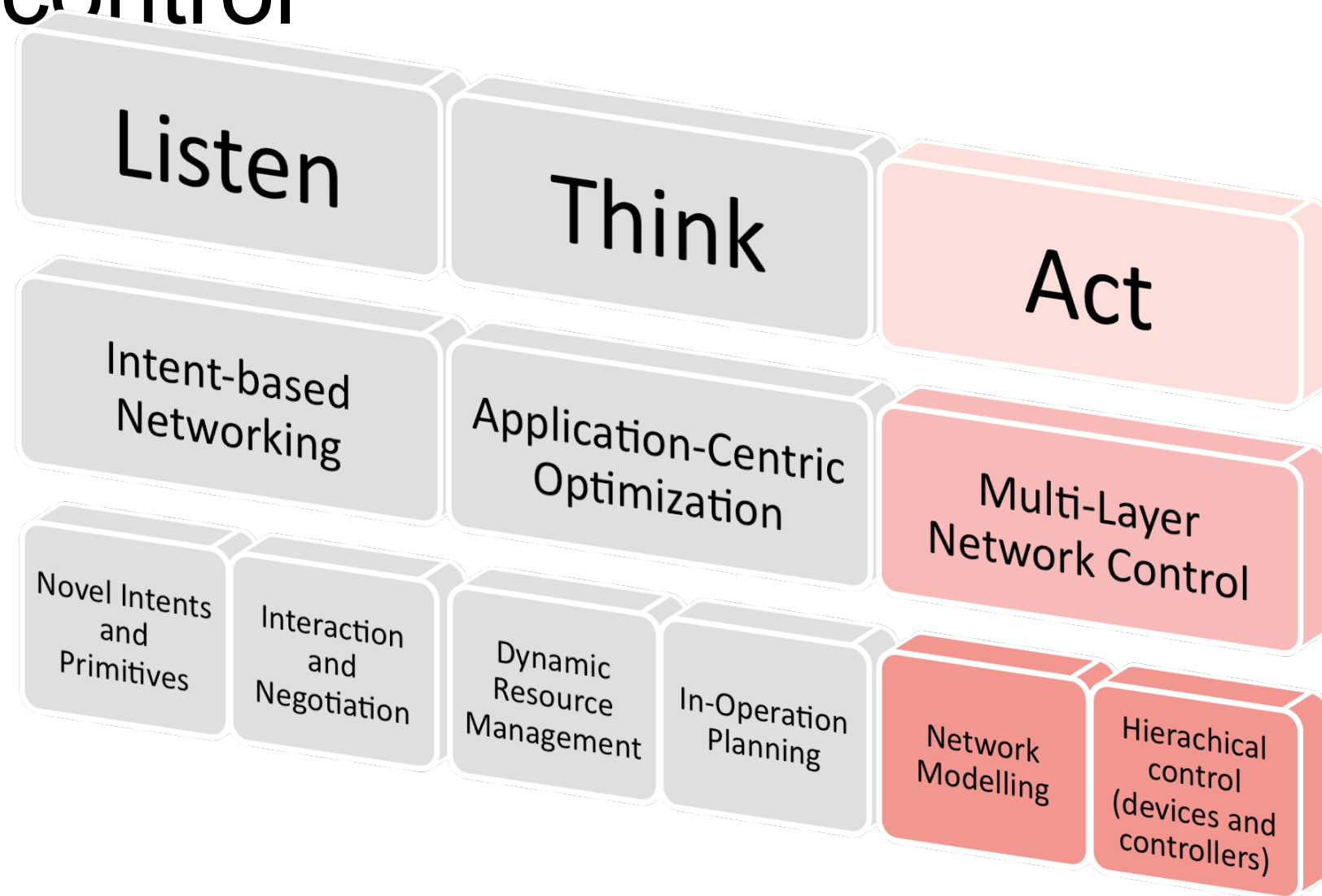


ACINO solution is superior
satisfies needs of applications &
does interests of network
operators (joint L3/L0 opt)

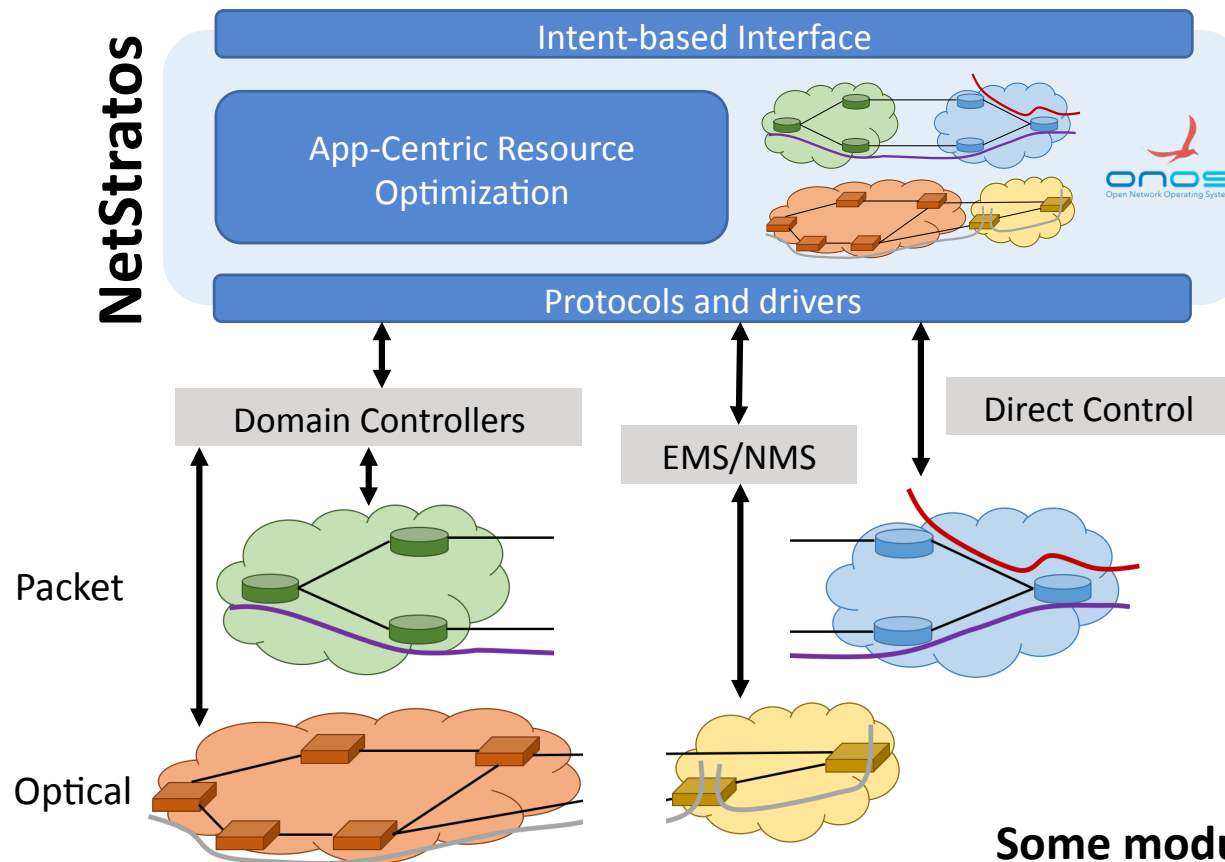
Same performance,
ACINO smaller cost

Same cost, ACINO
better performance

Provide multi-layer network control



Network Control: NetStratos



- **Visibility**
 - Service to fiber
- **Dynamicity**
 - Real time operations
- **Completeness**
 - Multi-layer
 - Multi-vendor

Some modules available in



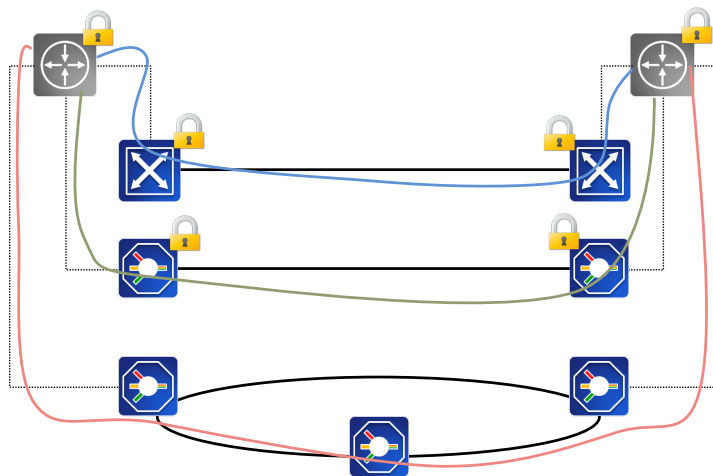
Github: <https://github.com/acino-h2020>

ACINO use-case: In-flight Encryption

- Mission critical infrastructures migrating to the Internet, distributed data centers or even cloud
 - Sensitive applications like government, banking and financial services
- Encryption at the endpoints not always available
- Solution: encrypt traffic during transmission according to applications' needs
 - Physical Layer (hardware-based)
 - Higher Layer (MACsec, IPsec ...)
- Move configurational complexity away from the client

Metric	IPSec	MACSec	Physical
Latency	High	Medium	Low
Throughput	Low	Medium	No Overhead
Payload Size	Restricted (IP Packet)	Restricted (MAC Frame)	Up to 100G
Flexibility	High (L3 Network)	L2 Network only	OTN or SONET/SDH only
HW Availability	High	Carrier Ethernet Capable	Vendor Specific

In-flight Encryption: Experiment



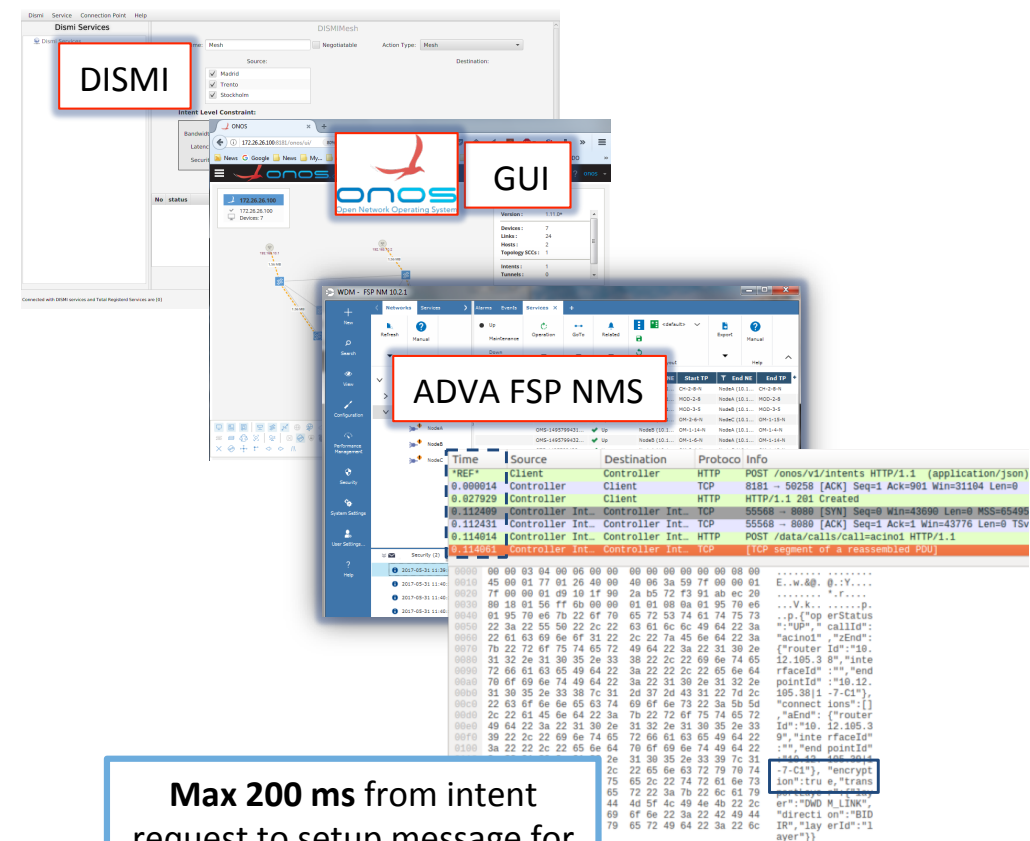
Provisioning of encrypted services over the south-bound interfaces
IPSec over GRE tunnels using OpenVSwitch
MACSec on Ethernet with T-API (encryption flag)
Optical Encryption with T-API (encryption flag)



OFC 2017



T. Szyrkowiec et al. "Automatic Intent-Based Secure Service Creation Through a Multilayer SDN Network Orchestration", JOCN, April 2018.



The image shows three overlapping screenshots of network management interfaces. The top-left screenshot is the DISMI (DISMI Services) interface, showing a 'Mesh' configuration with 'Source' and 'Destination' fields. The top-right screenshot is the GUI (Open Network Operating System) interface, showing a 'Mesh' configuration with 'Source' and 'Destination' fields. The bottom screenshot is the ADVA FSP NMS (Network Management System) interface, showing a 'WDM - FSP NM 10.2.1' configuration with a table of network elements and their status.

Max 200 ms from intent request to setup message for encrypted IP or optical tunnel

Summary

- Applications are driving force for network evolution
- ACINO[🌱] proposes a complete multi-layer orchestration framework to cater to applications' requirements
- Key contributions
 - **Learn**: advanced intent-based interface
 - **Think**: app-centric algos for dynamic allocation of resources
 - **Act**: multi-layer hierarchical network control
- Demonstrated concept with operator-driven use-cases
- Open-source development

Thank you for your kind attention!

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