CENTRE FOR SECURE INFORMATION TECHNOLOGIES

Queen's University Belfast

SDN Security

COINS Summer School

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@CSIT_QUB

Implementation Challenges of SDN

Implementation Challenges

Performance vs. Flexibility

Scalability

Interoperability

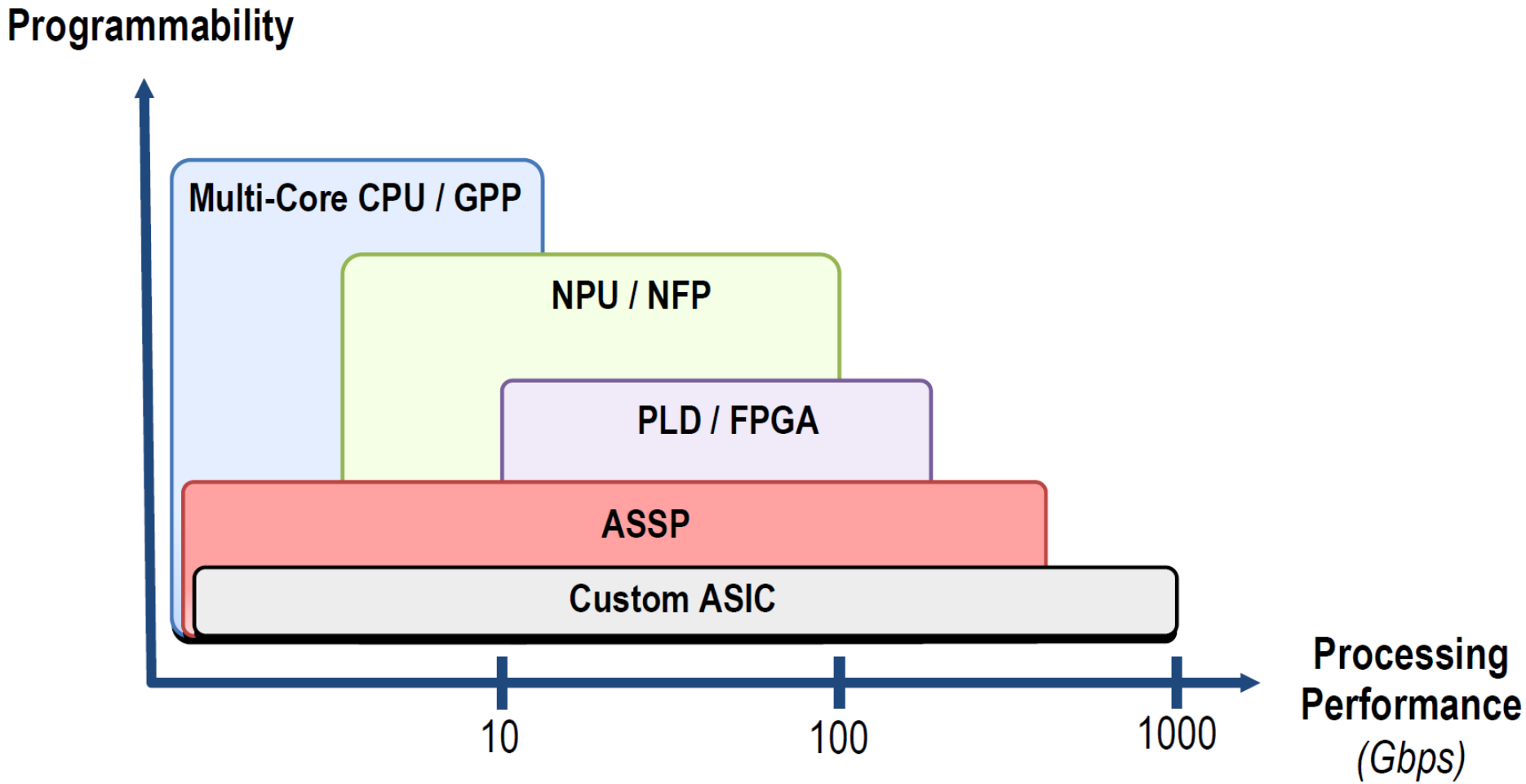
Security

Performance vs. Flexibility

How can the programmable switch be achieved?

Performance –	Processing speed of the network node considering both throughput and latency
Programmability –	Capability to change and/or accept a new set of instructions in order to alter functional behaviour
Flexibility –	Ability to adapt systems to support new unforeseen features (e.g. applications/protocols/security measures)

Performance vs. Flexibility



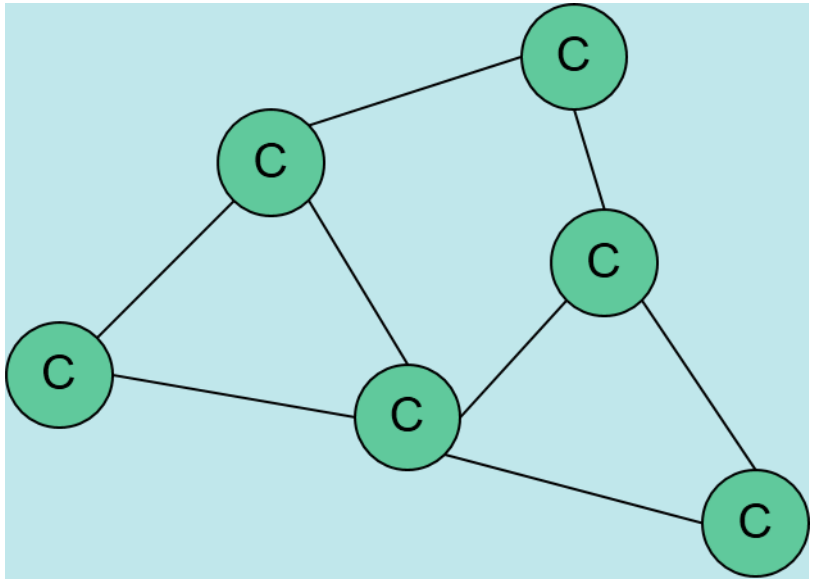
=> Combine technologies for a hybrid architecture

Scalability

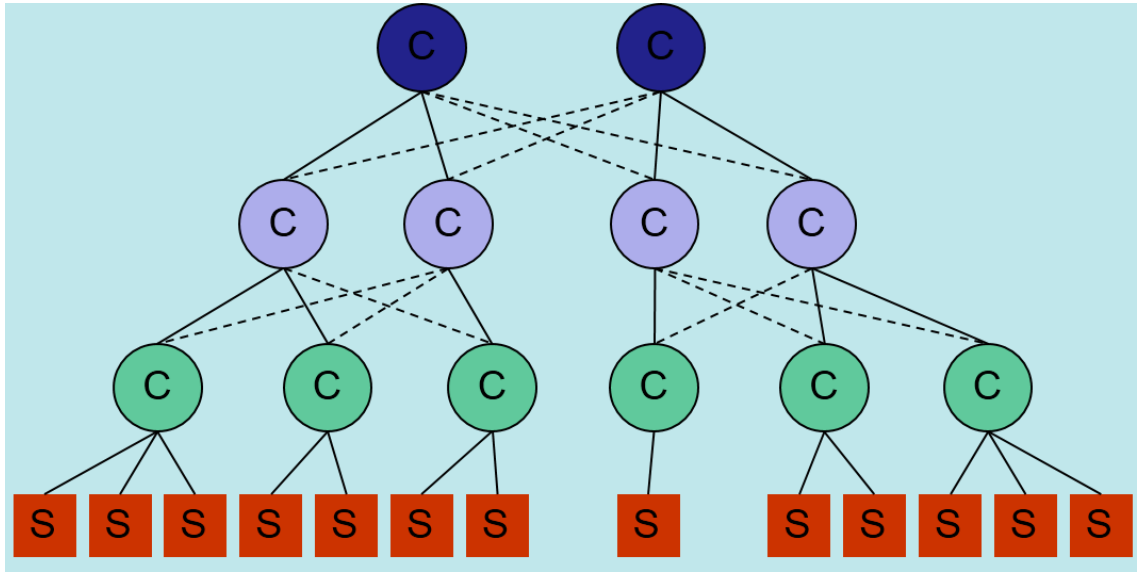
How can the Controller be enabled to provide a global network view?

- Latency introduced by exchanging network information between multiple nodes and a single controller
- How SDN controllers communicate with other controllers using the east-westbound APIs
- Size and operation of the controller back-end database

Distributed Control - Clustering



Hierarchical Control



Security

How can the Software-Defined Network be protected from malicious attack?

- Authentication and authorization mechanisms for multiple organizations to access network resources (isolation, protection)
- Controller impersonation
- Denial of Service – Packet-In Flooding, Flow Table Flooding
- Open APIs = Open doors?

Interoperability

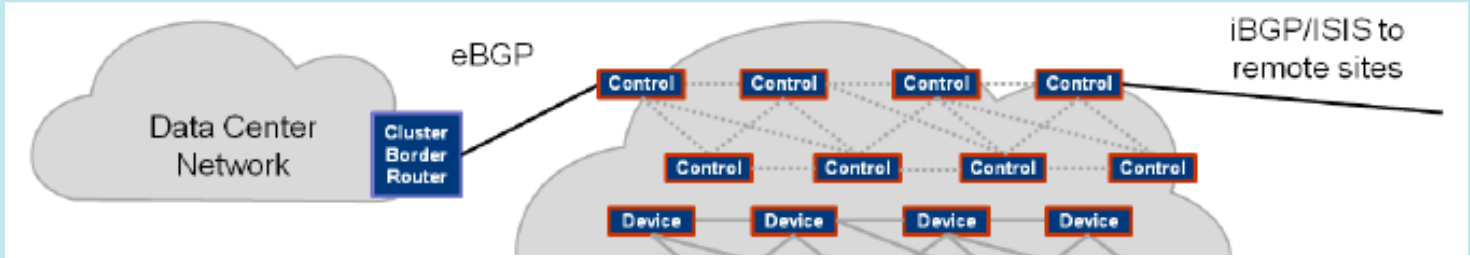
How can SDN solutions be integrated into existing networks?

- Legacy-to-Greenfield, Legacy-to-Mixed, Legacy-to-Hybrid (=> hybrid switches)
- Standardization
- Conformance and Interoperability Benchmarking (ONF PlugFest)

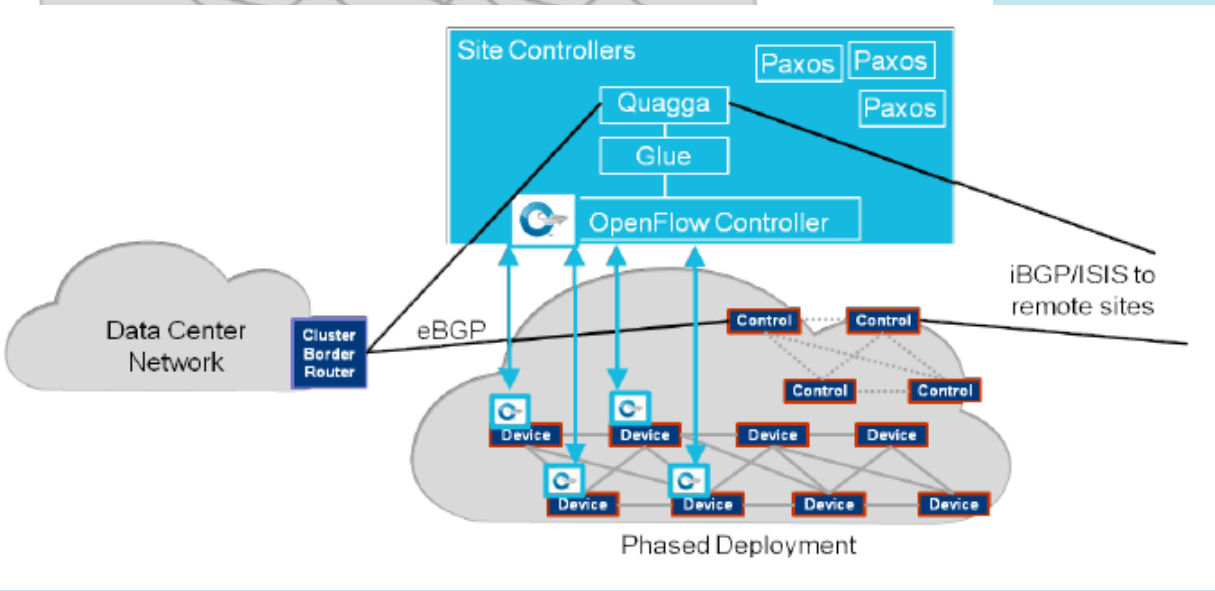
Interoperability

Google legacy-to-hybrid migration:

B4 Starting Network



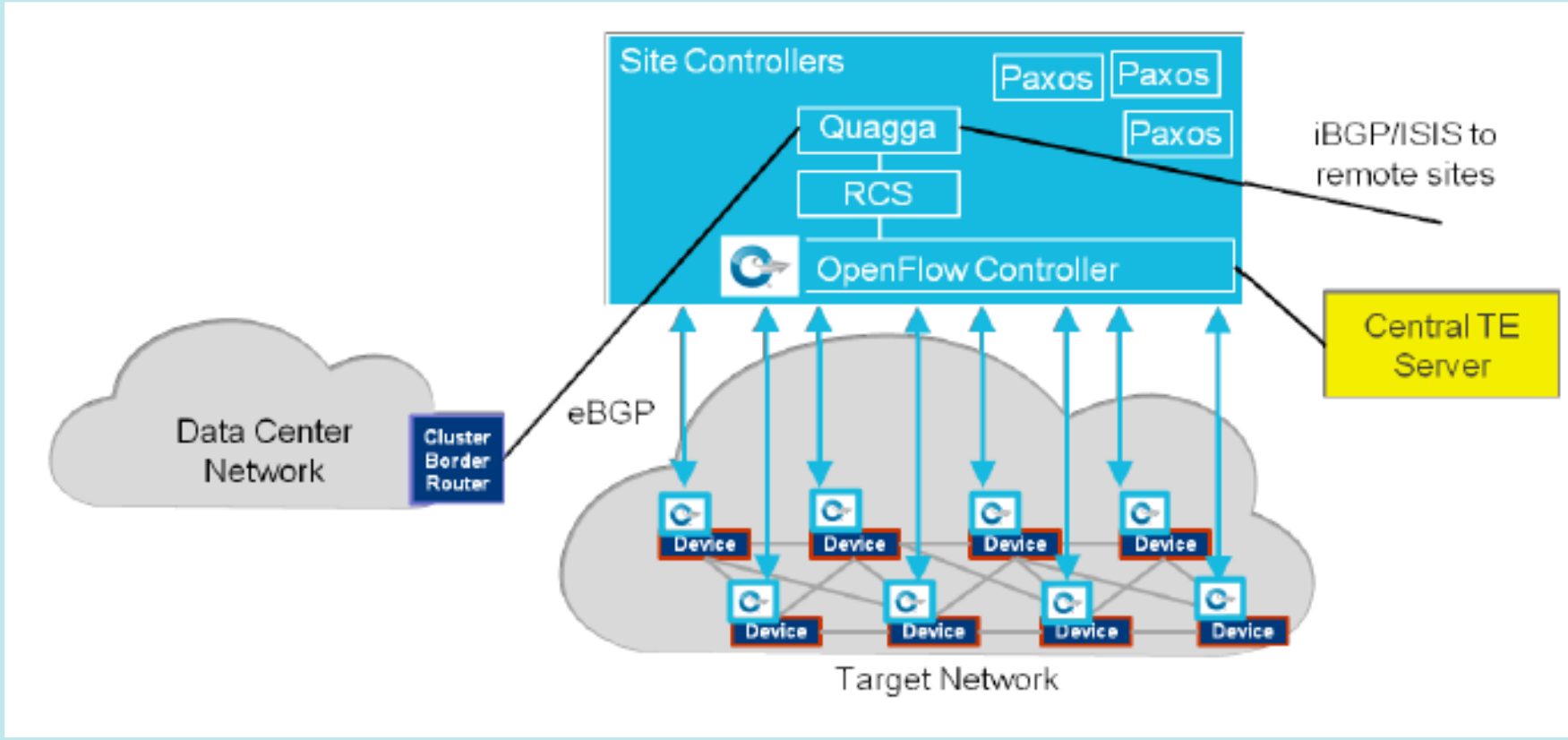
B4 Phased Deployment Mixed Network



Open Networking Foundation, "SDN Migration Considerations and Use Cases," ONF TR-506, 2014

Google legacy-to-hybrid migration:

B4 Target Network



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End Session 3