# BGP Evolution
## - from “SDN” perspective

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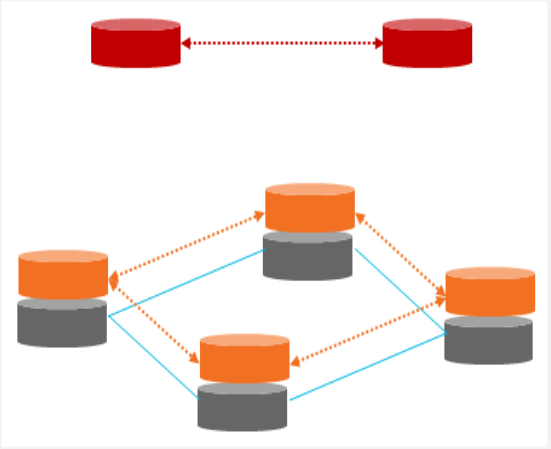
- Stefano Previdi (sprevidi@cisco.com)
- And many others!

# Agenda

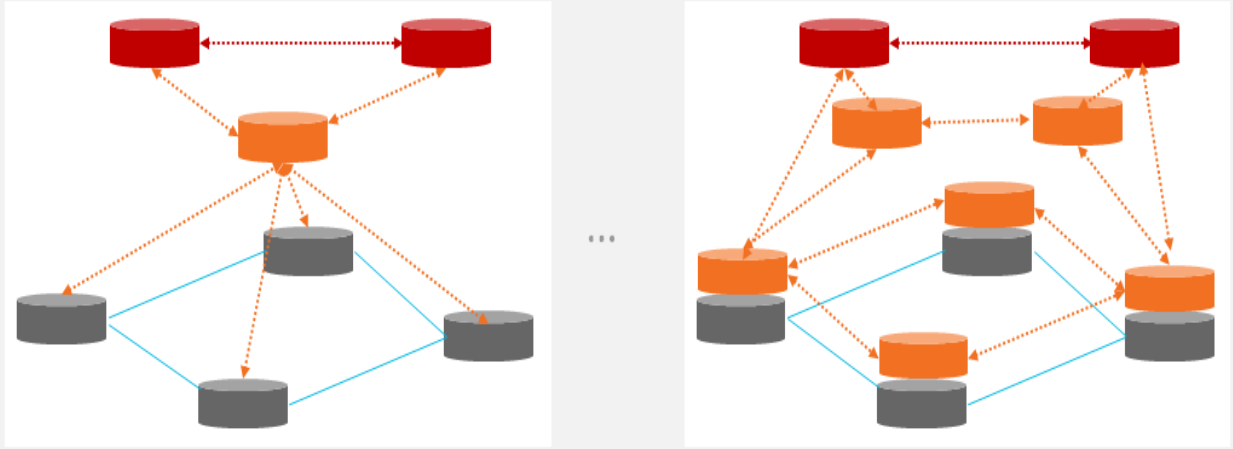
- SDN in a nutshell
- BGP as an Abstraction Method

# Control Plane Architecture with SDN

Traditional Control Plane Architecture



Control Plane Architecture with SDN (Examples)

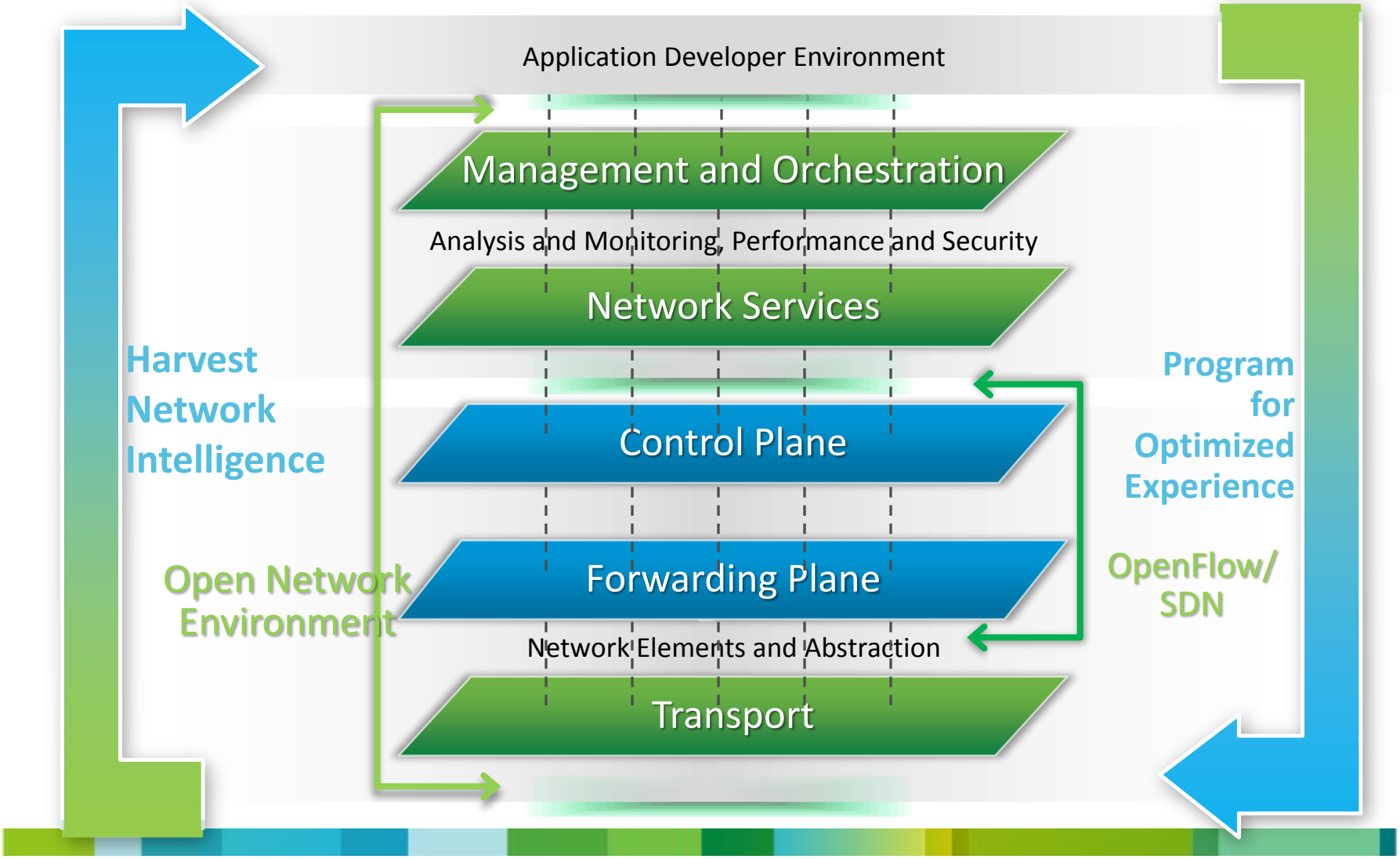


- Enable modularization and componentization of network control- and data-plane functions, with associated open interfaces: Allow for optimized placement of these components (network devices, dedicated servers, application servers) and close interlock between applications and network functions; combining the benefits of distributed and centralized control plane components
- Anticipated benefits include: Closely align the control plane with the needs of applications, enable componentization with associated APIs, improve performance and robustness, enhance manageability, operations and consistency – while maintaining benefits of standardized distributed control planes.

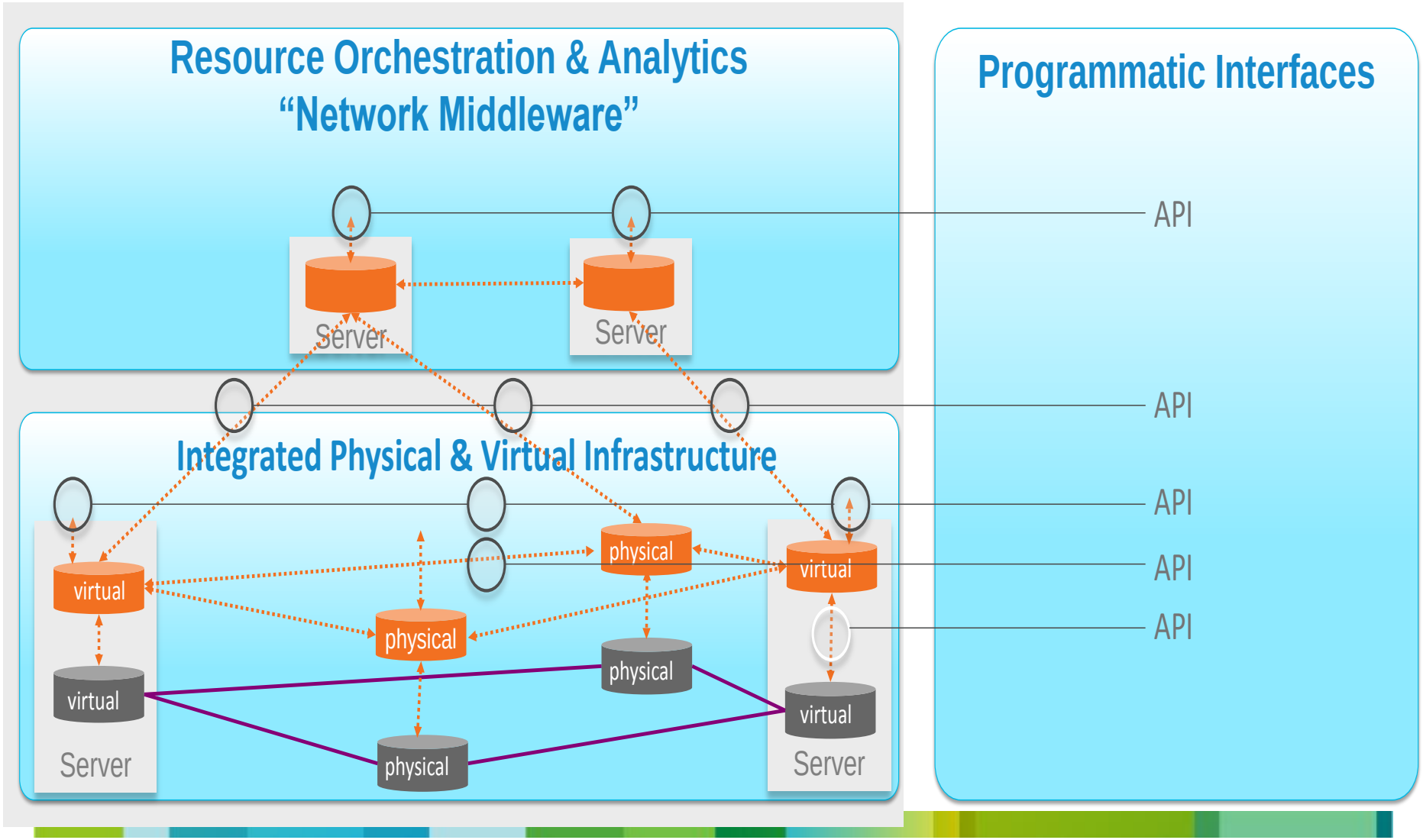
Application components  Control-plane component(s)  Data-plane component(s)

# Exposing Entire Network Value

## - Multi-layer Programmability



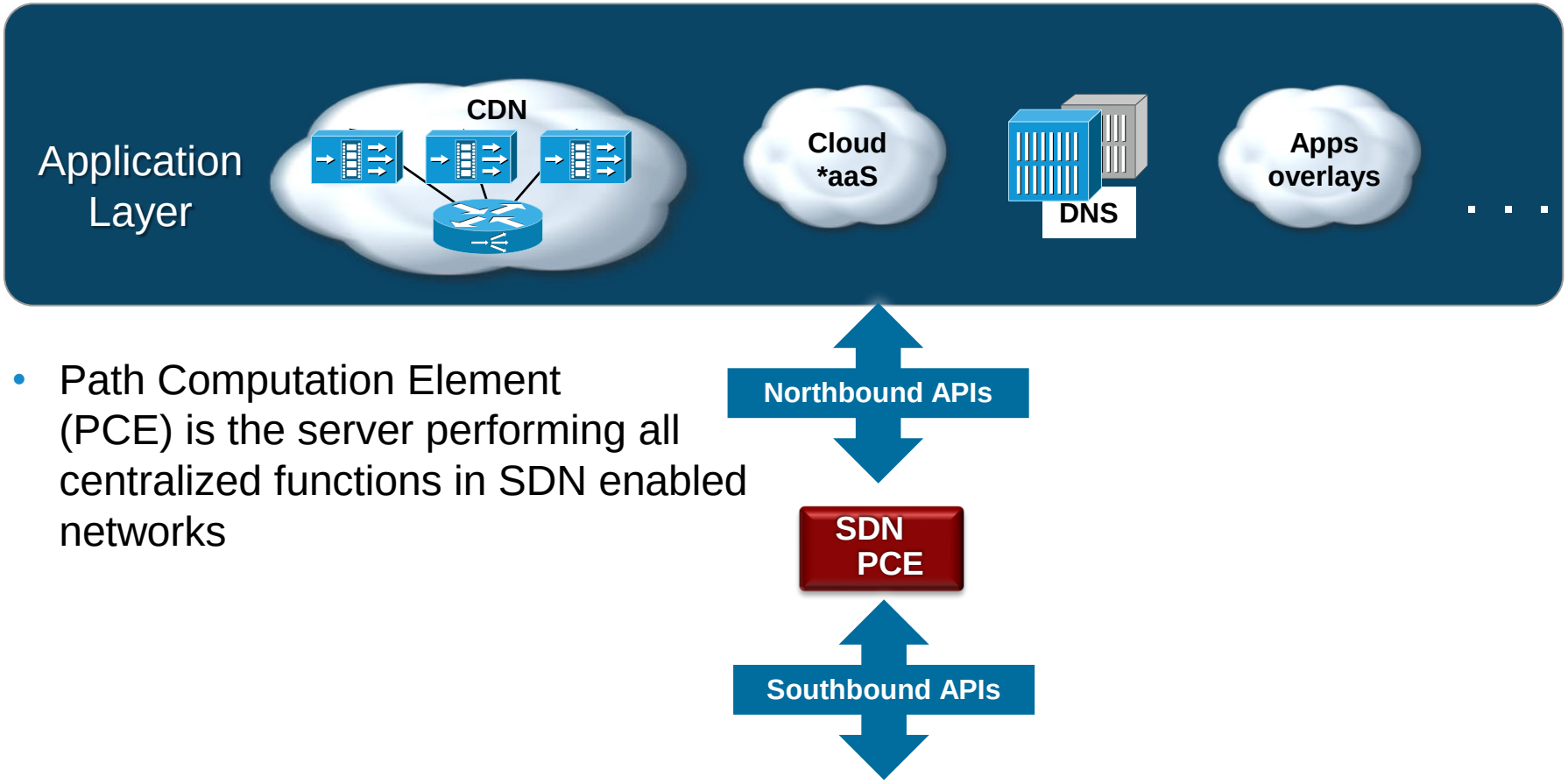
# Open Network Environment



# Agenda

- SDN in a nutshell
- *BGP as an Abstraction Method*

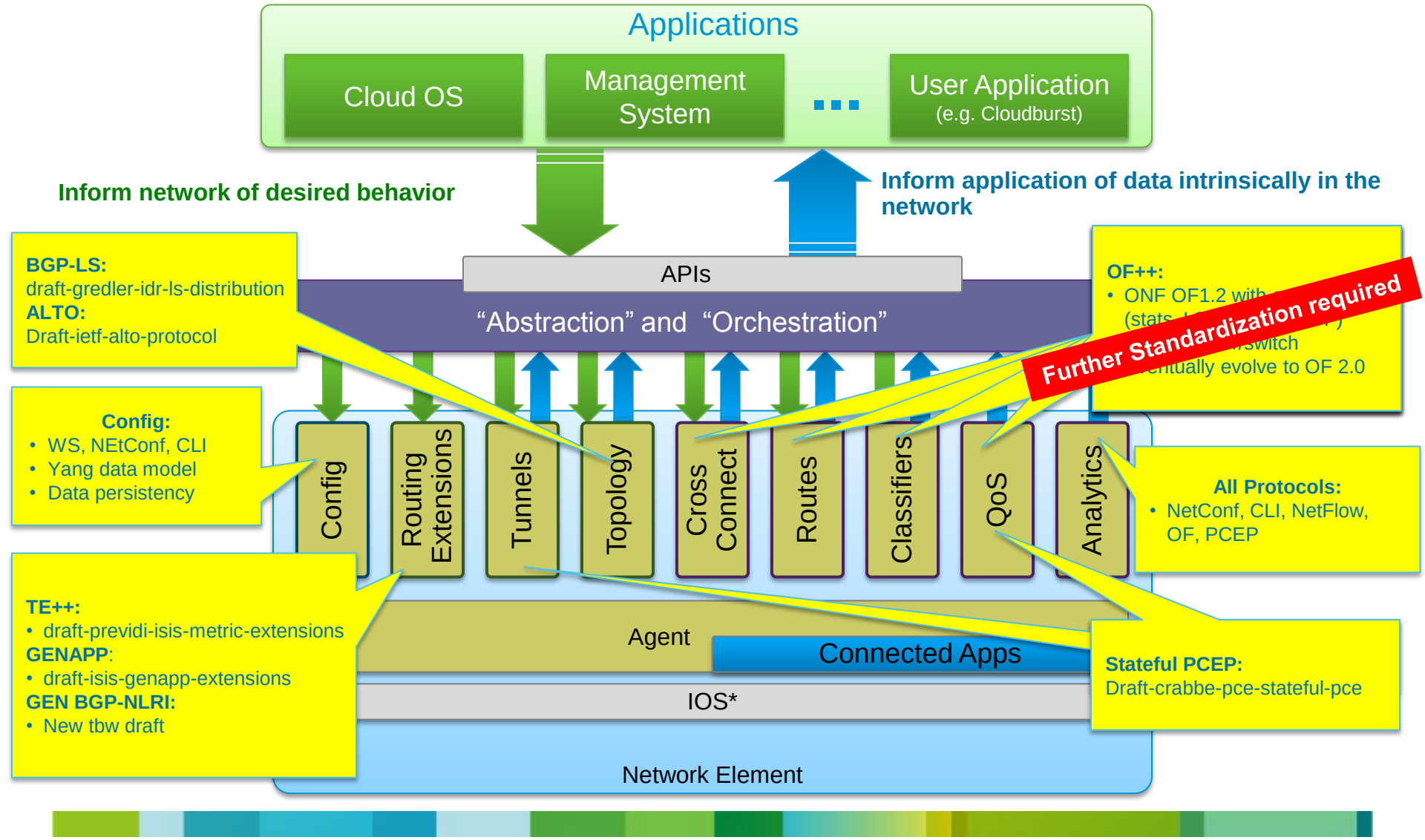
# Software Defined Networks : PCE




- Path Computation Element (PCE) is the server performing all centralized functions in SDN enabled networks

# Creating differentiation through extensible Programmability

## Multilayer PCE Open/Standardized APIs



# BGP-LS for Topology Distribution

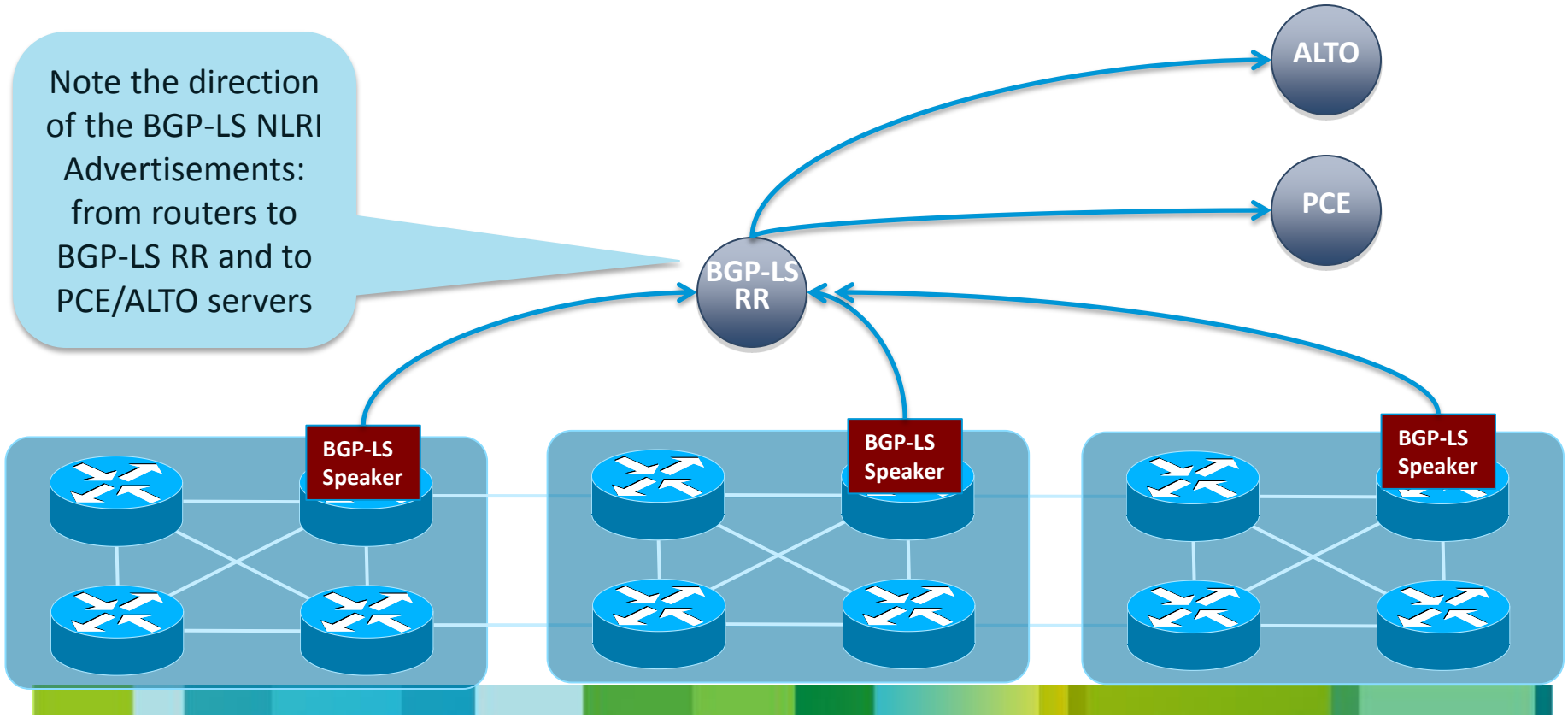
- draft-ietf-idr-ls-distribution-00
- One or more BGP speaker per routing area will translate LSDB/TE into NLRI extensions
- Classical BGP operations and rules apply
  - Selection algorithm
  - Route Reflection / propagation
  - Attributes
- BGP allows multi-hop sessions and hence a much more flexible way to distribute information
  - I.e.: no need to have layer-3 adjacencies

# BGP-LS for Topology Distribution

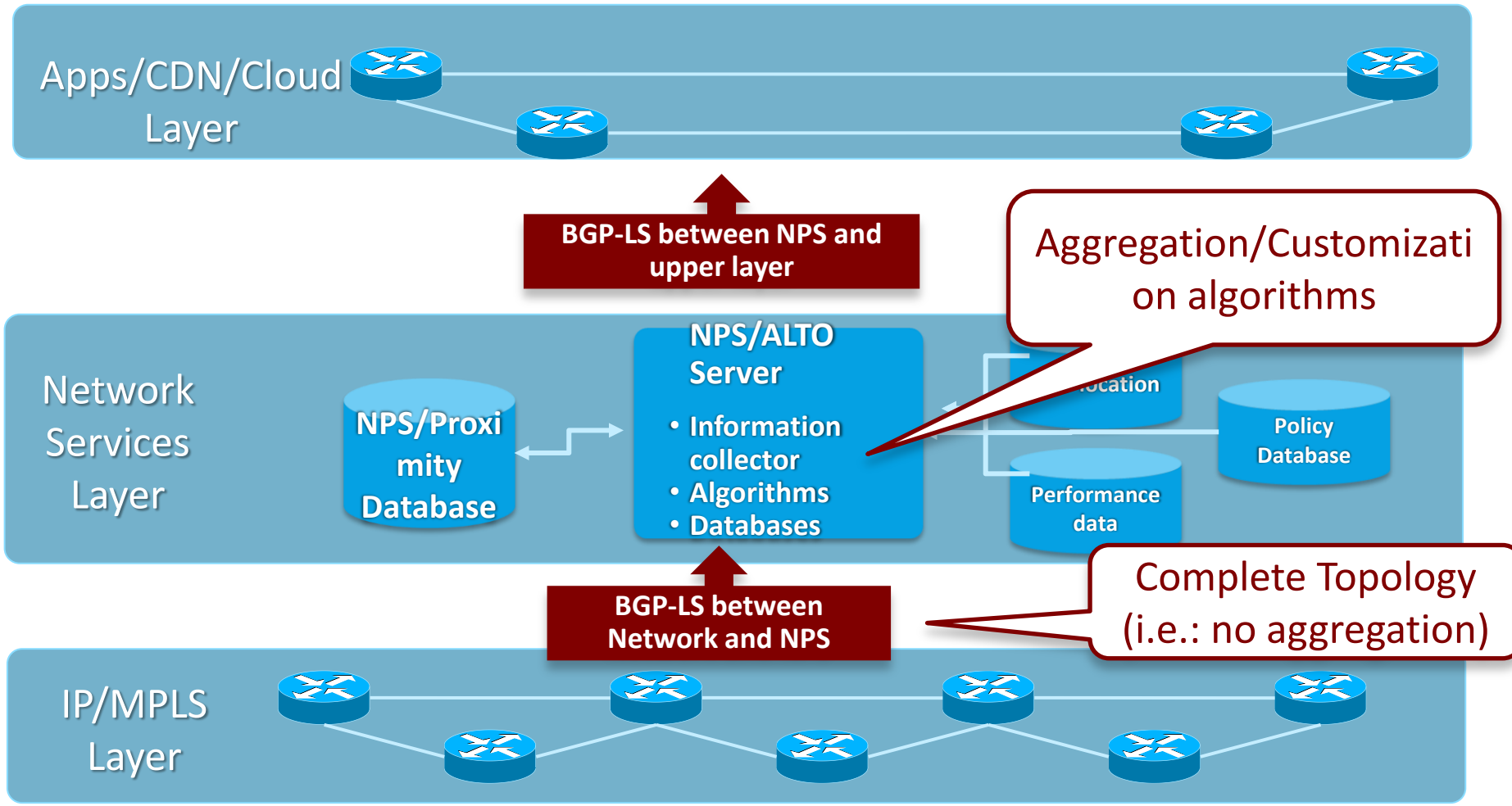
- New BGP NLRI for:
  - Link and Node descriptors
  - Draft tends to minimize new encoding format
    - Replicate what available in ISIS and OSPF encodings
- NLRI TLVs allow LSDB and TED encoding
  - With all attributes
- However, any form of topology (real, virtualized) can be encoded
  - Links/Nodes can be aggregated: only advertise big pipes
  - Links/Nodes can be hidden: only advertise what consumer needs
- The scheme allows maximum flexibility in order to deliver topology

# BGP-LS for Topology Distribution

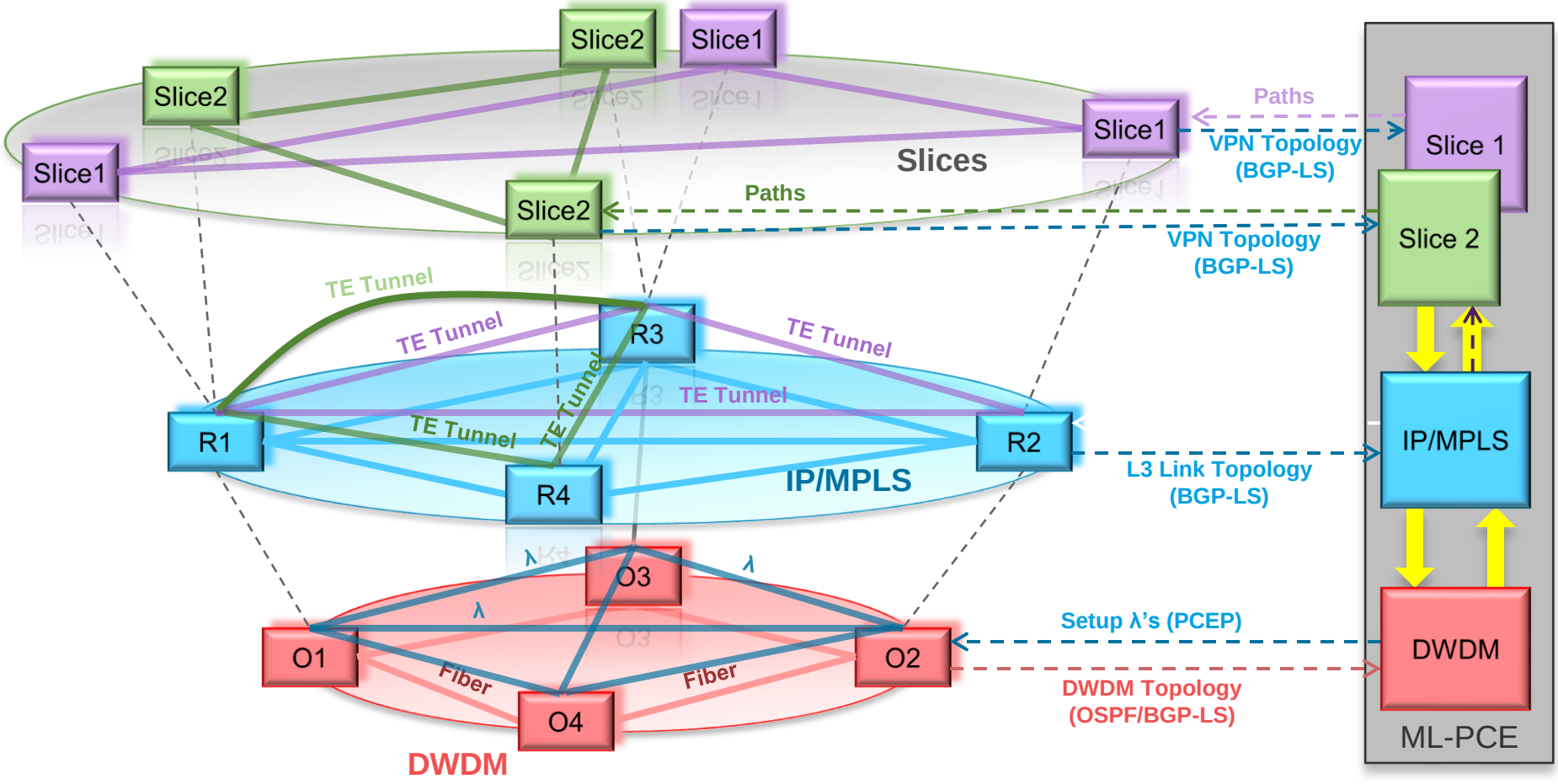
- One or two routers per area redistribute IGP topology into BGP-LS NLRIs
- BGP-LS NLRI are sent to BGP-LS RR that reflects them to ALTO and PCE servers
- Nothing is advertised to routers



# BGP-LS: Network Guidance Use Case



# BGP-LS : Multilayer-PCE Use Case



# Thank you !!