Automating XR Protocols

XR Toolbox

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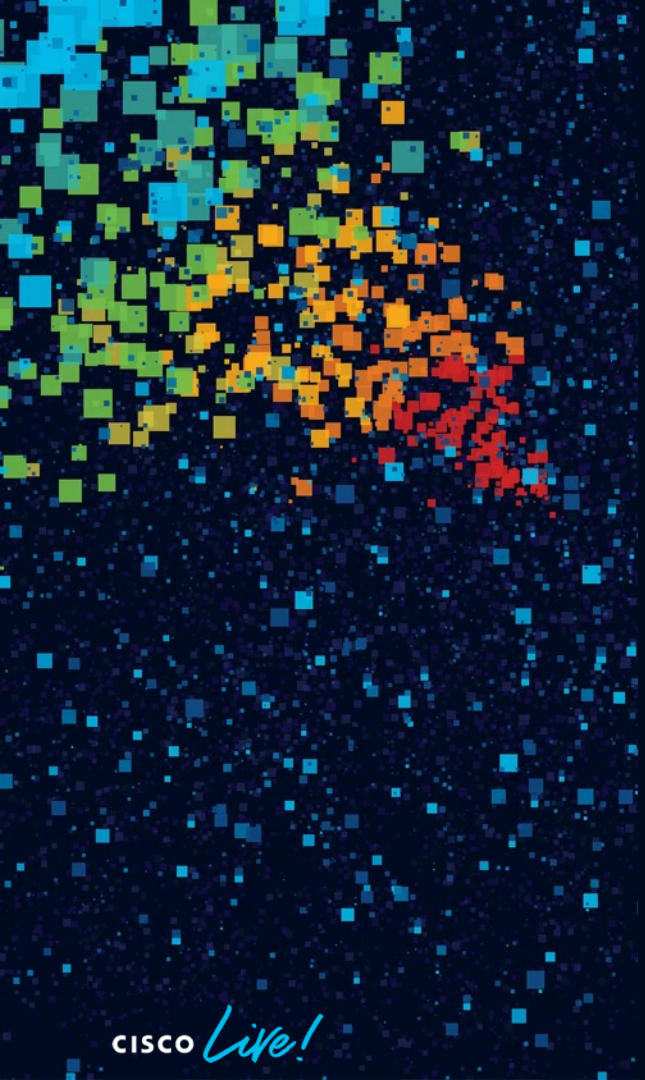


Agenda

- What is Protocol Automation?
- The Automation Gradient
- Delivering Protocol Automation
- Preview Demos

SP Automation Journey – Path to Protocol Automation

Day -1: Planning

All Planning Functions prior to Network

Product(s) Available:
- Crosswork Qualification Engine (CQE)

Day 0: Bring Up

Bring Up Functions Including ZTP & Software Image Management (SWIM)

Product(s) Available:
- XR ZTP
- Crosswork ZTP

Day 1: Operate

Network Services & Transport Operations

Product(s) Available:
- XR Yang Models & Telemetry

- Change Automation
- Health Insights
- Network Controller

Day 2: Assurance

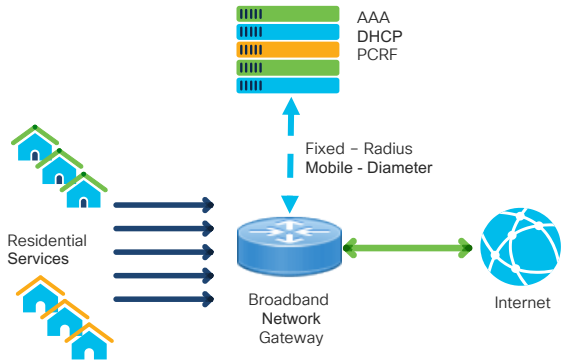
Protocol level Troubleshooting

Product(s) Available:
- Day 1 Offerings

Future Add-Ons:
- Protocol Automation

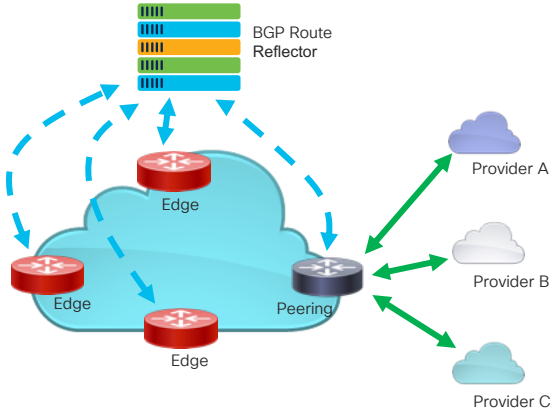
Long History of Protocol Automation

BNG – 1999 – The First SDN App



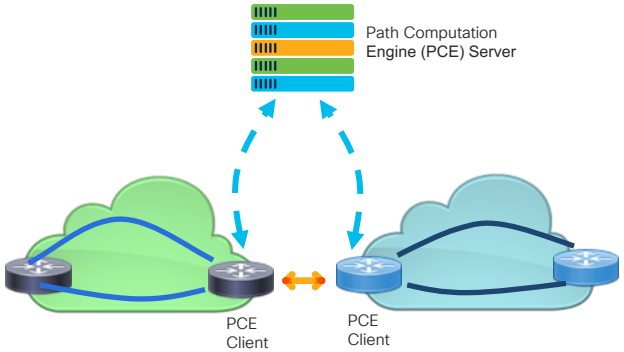
- Residential Services – High Scale by Nature
- Changes had to be applied Programmatically

BGP Route Reflector - 2000



- MPLS BGP VPNs (rfc2547) key driver for BGP RR
- Not just Peering, but every Edge needed BGP

Inter AS Traffic Engineering - 2005



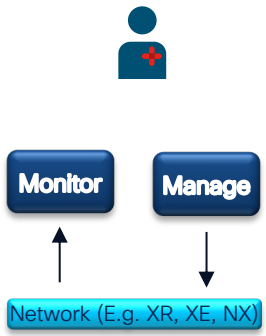
- Traffic Engineering relies on OSPF/ISIS
- For crossing AS boundaries – a PCE approach was adopted

Protocol Automation = Extension of Network OS function (or XR)

Automation Gradient

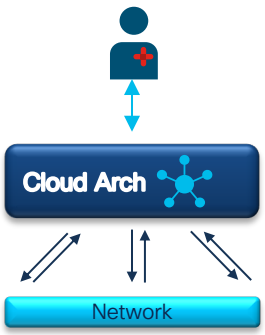
Analogy: SAE Level 1-5 for Self Driving cars

"Level 1" = NMS



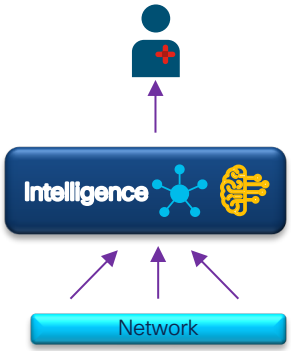
- No APIs
- Distinct Apps
- Fixed GUI

"Level 2" = Evolve Device to Network + APIs



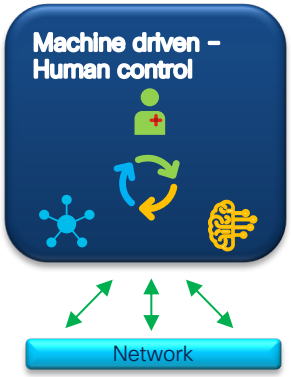
- Open APIs
- Service Models
- Flexible GUI

"Level 3" = Profile with ML/MR Algos



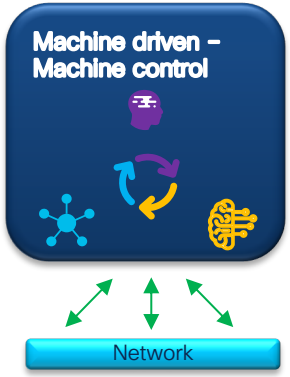
- Use ML algos for Trends
- Use MR expert systems for Troubleshooting

"Level 4" = Closed Loop (With Intervention)



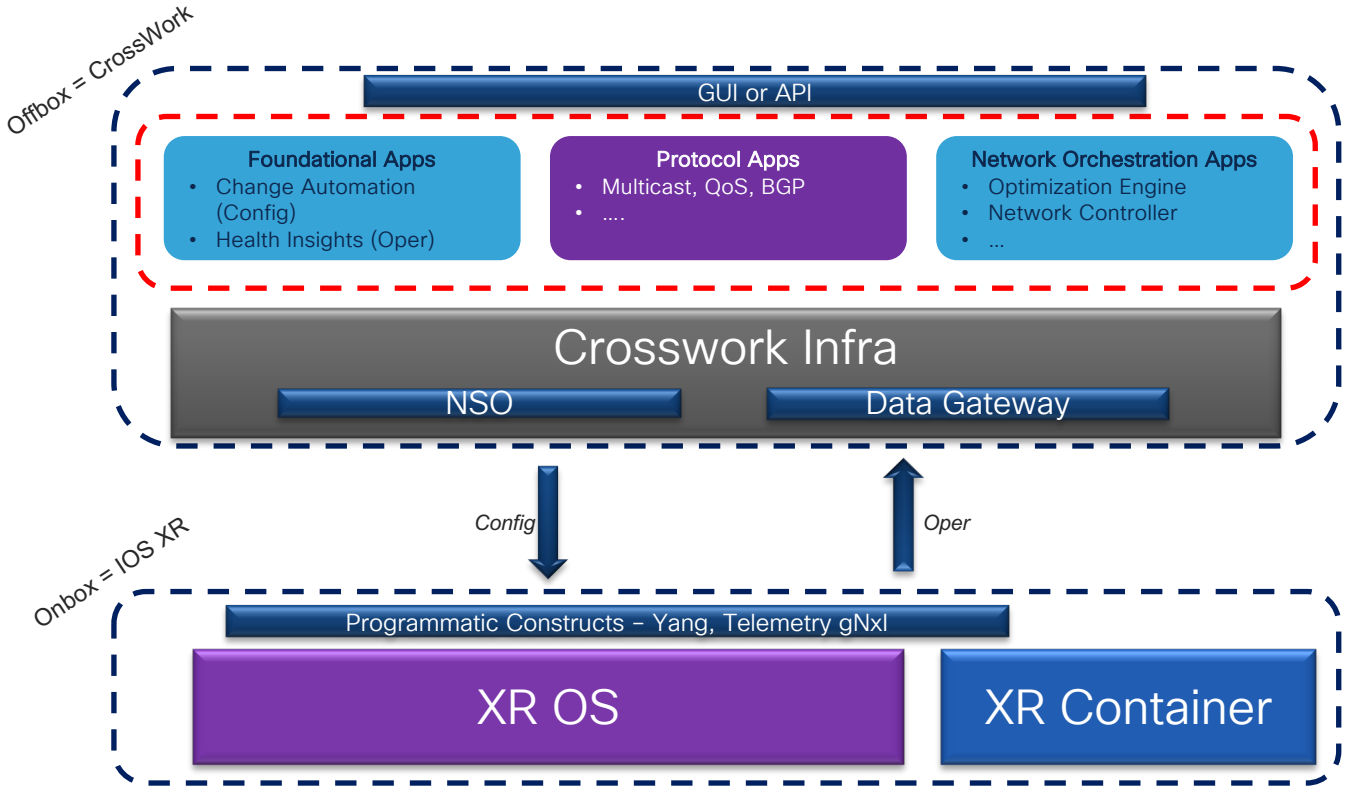
- Use ML + MR Algos with ability to control Network
- Human Control Intact

"Level 5" = Closed Loop (No Intervention)



- Decommission Elements when unable to handle
- Human intervention for 'out of sample' scenarios

Cisco Full Stack Software Offerings for Providers



- Onbox + Offbox = Vertical Software Integration
- Tight Interaction with fully Open APIs
- Programmatically extend to OSS (or 3rd party systems)

Preview Demos

Area	Description
Multicast	• Display Multicast Health for VPNs and Trees based on Telemetry • Realtime topology views of the network state • Machine Reasoning based Expert systems using Rules to troubleshoot Multicast Outages (via simulation) • Perform a Network Action to resolve issue – driving Closed Loop Protocol Automation
QoS	• Display QoS health for Queuing & Policing based on Telemetry • Realtime topology views of the network state • Machine Reasoning based Expert systems to detect issues with 3 class configuration of voice, video & data • Perform Network Actions to tune queuing & policing parameters based on health state
BGP	• Display BGP health for Layer 2 and Layer 3 VPNs based on Telemetry • Realtime topology views of the network • MR based rules with BGP level process on memory utilization, CPU utilization, NSR Readiness, Process restart count and blocked threads • Perform Network actions to ensure BGP health stays within ‘green’ state

More Info

- Demos located at – http://developer.cisco.com/devnetday

- Need more Info? Drop a note to the Engineers at xr-apps@external.cisco.com

Thank you

Possibilities

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