Toward a Network Telemetry Framework

draft-song-ntf-02

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Challenges of Today's Networks

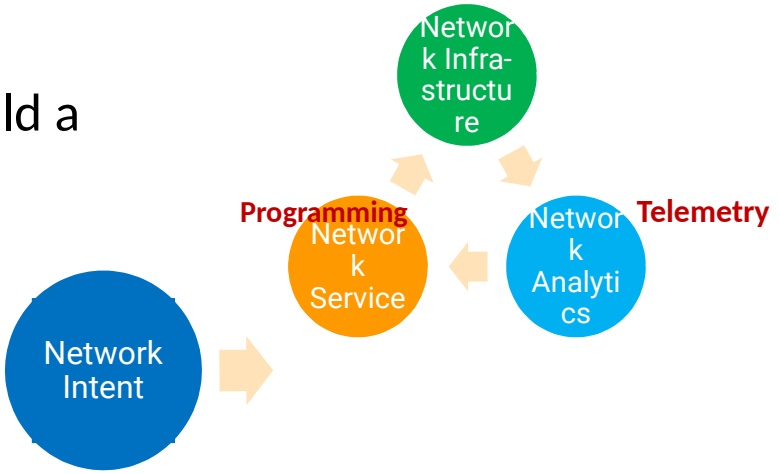
- Networks become more and more complex
  - Cloud, 5G, IoT, overlay, underlay, VPN, slicing, …
- Applications are sensitive to network performance
  - Bandwidth, latency, jitter, packet drop, network churn, …
- Network visibility is important for
  - Network OAM
  - Network Provision
  - Network Planning
  - Network Security
  - Network Troubleshooting
- Yet our old tools for network visibilities are outdated
  - Lack of application level visibility
  - Lack of automation tools

Challenges of the Future Networks

- Network management and service evolve to become intent-driven and automatic
  - Reduce human labor
  - Improve agility and performance
  - Optimize resource efficiency
- Network visibility through telemetry is pivotal to realize intent-driven autonomous networks
  - Telemetry can provide rich, reliable and real-time data, and build a close-loop network service management system.
  - Telemetry should be promoted as a first class

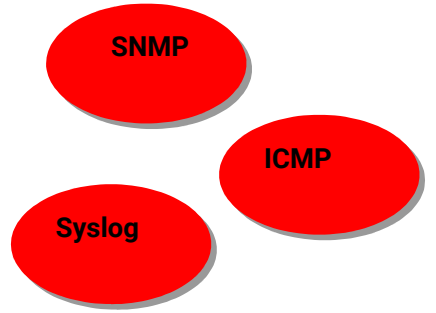
  citizen in network technologies and protocols
  - Telemetry work should be better unified,

  consolidated, and integrated to support the future networks



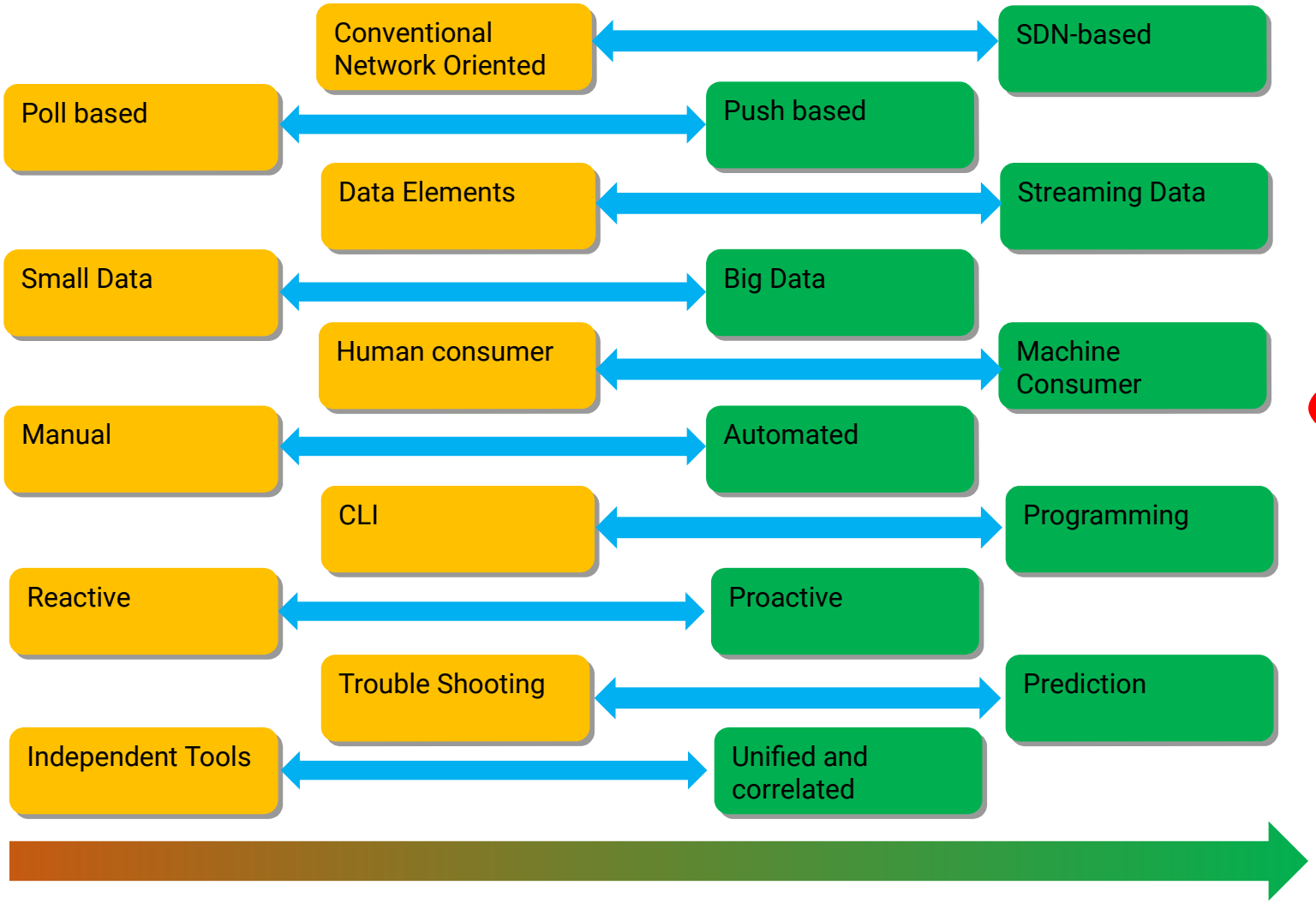
Current Solution: Network OAM

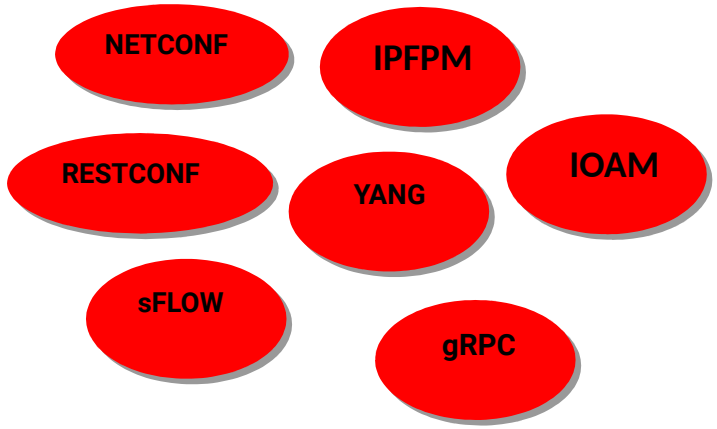
- Conventional OAM is inefficient and insufficient to sustain future autonomous networks
  - SNMP is based on low frequent polling and CLI
  - Lack of coverage, timeliness, and accuracy



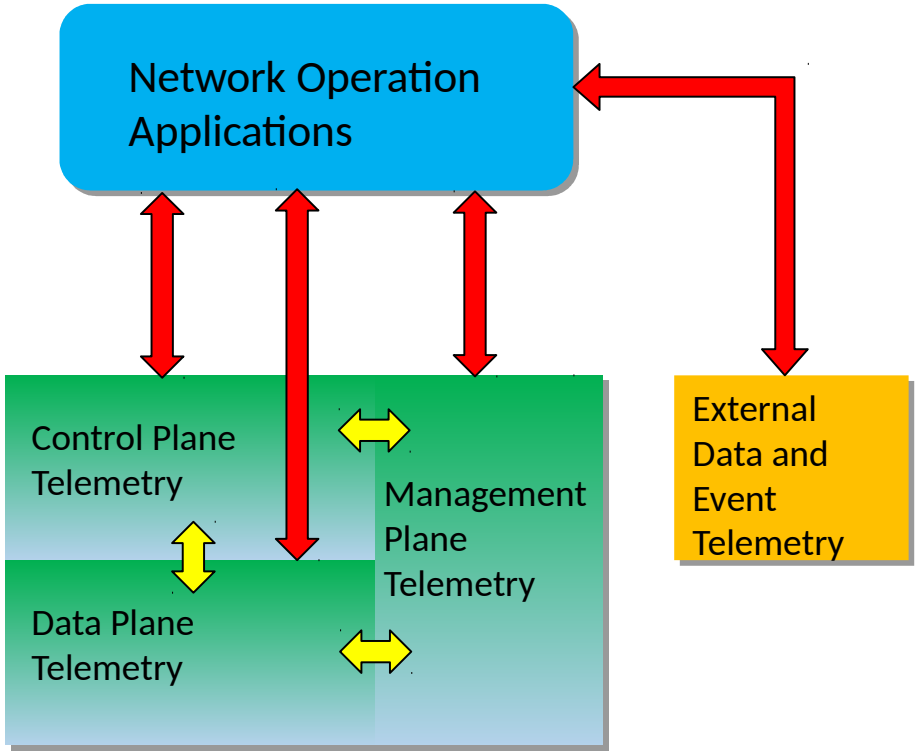
- Existing OAM mechanisms are disaggregated
  - Piecemeal vertical solutions are hard to be composed into a cohesive one
  - Repetitive and redundant work, lack of collaboration and consolidation
  - Designed as afterthought patches and on a case-by-case basis, lack of holistic and systematic view
- A new brood of technologies is expected
  - A framework is needed to normalize the concepts, terms, and technology/standard developments
  - Telemetry to replace OAM as the standard term to achieve network visibility

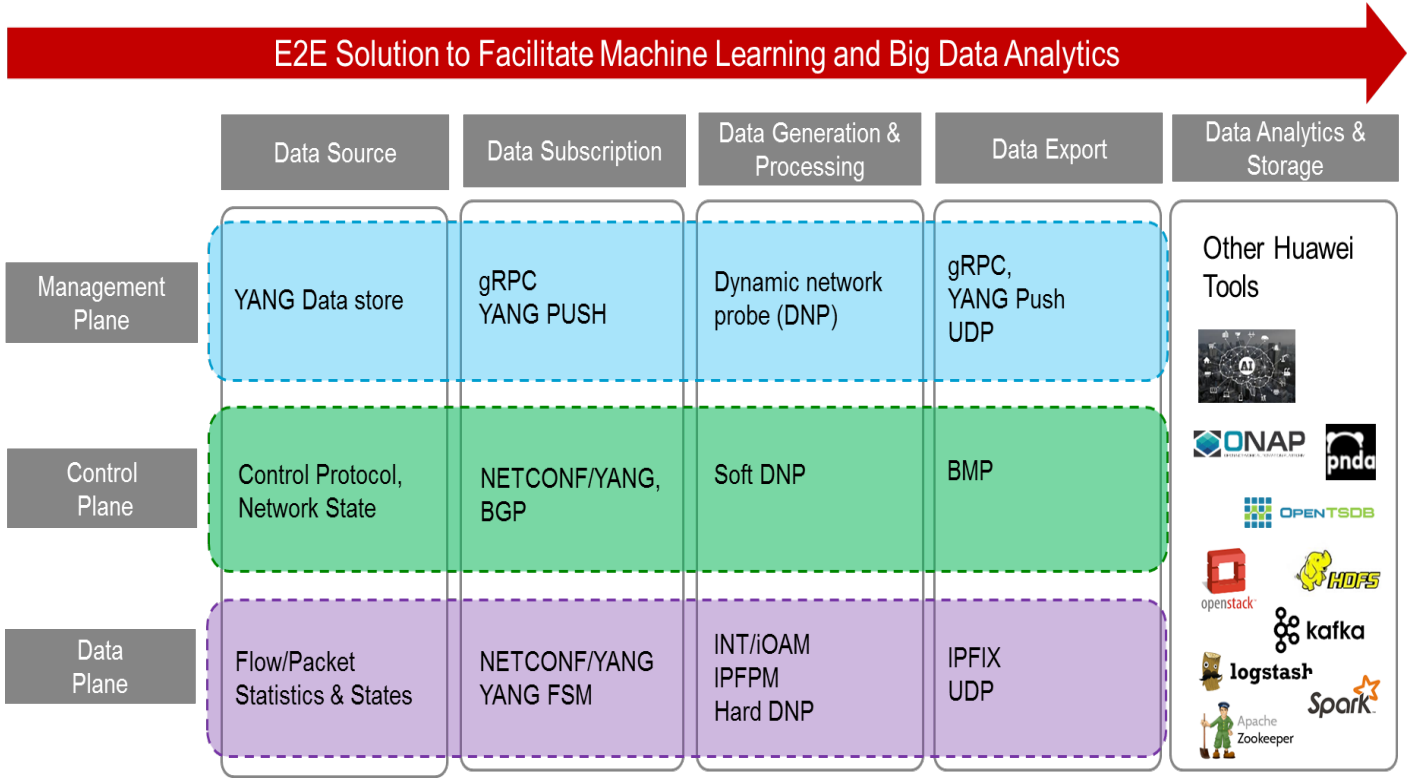
Conventional Network OAM vs. Network Telemetry





Network Telemetry Framework (NTF)





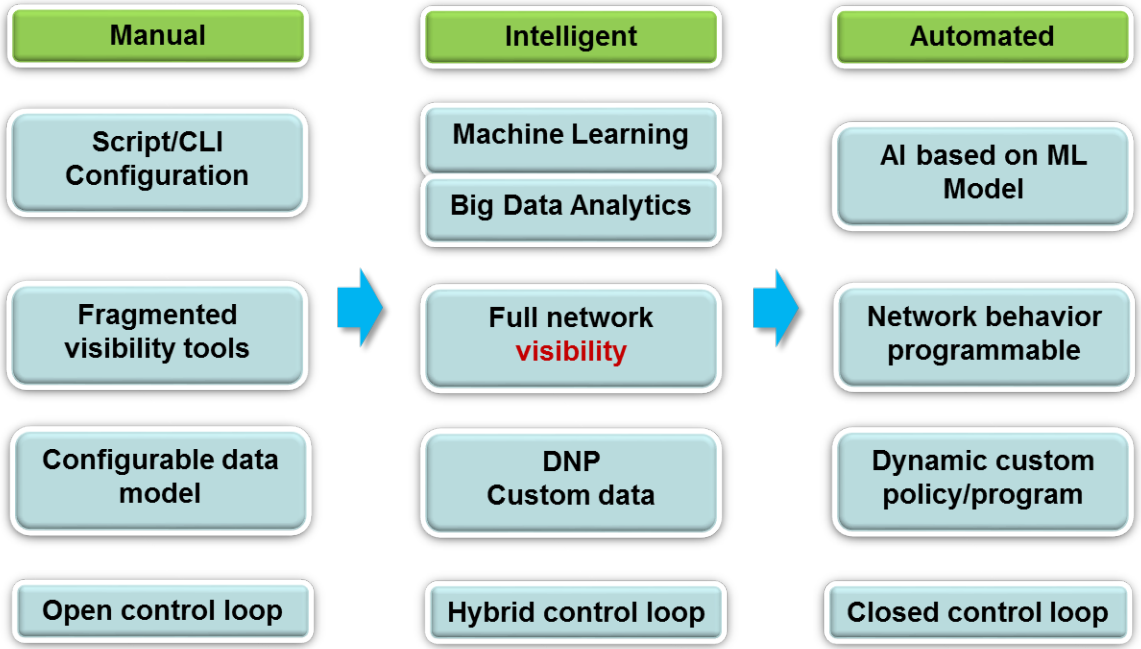
Telemetry Use Cases

- Intent and Policy Verification
- SLA Compliance Verification
- Root Cause Analysis
- Traffic Engineering and Network Planning
- Event Tracking and Prediction

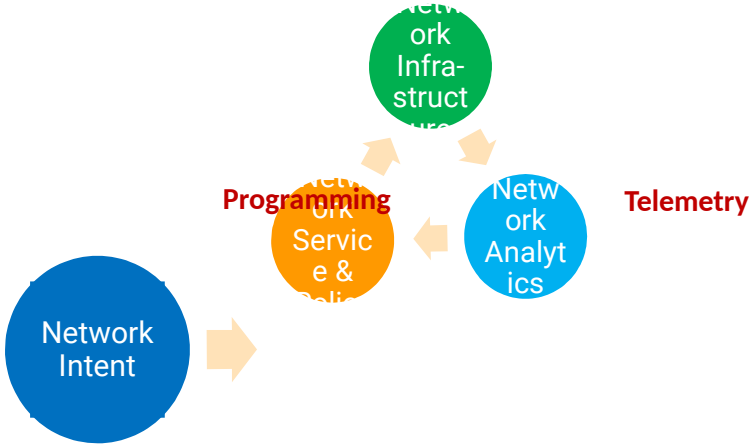
Challenges of Network Telemetry

- Dynamics
  - Continuous, real-time, and interactive
- Multiple sources
  - In device, in network, and out of network
  - Passive, active, and hybrid
- Performance impact
  - Bandwidth and latency
  - Data retention
  - Observer effect

Telemetry as Cornerstone for Future Autonomous Network



- **Telemetry can provide rich, reliable and real-time data, and build a close-loop network service management system.**



Recap & Conclusion

- Promote the significance of telemetry work in IETF
  - Keep the big picture in mind (Intent-Driven Autonomous Network)
  - Make IETF the leading SDO in this area
- Formalize the telemetry-related terms and technology classification in IETF
  - Network measurement, troubleshooting, and monitoring are all data oriented and serve for the network visibility
  - Consolidate existing work
  - Guide future work

Updates Since Last Meeting

- More cooperations: Giuseppe Fioccola (Telecom Italia), Zhenqiang Li (China Mobile), Pedro Martinez-Julia (NICT), Laurent Ciavaglia (Nokia) and Aijun Wang (China Telecom) joined as the co-authors.
- Section 1.4. Network Telemetry: characteristics are defined to identify the scope of work.
- Section 3.3. Control Plane Telemetry: identify the requirements and challenges in details. BMP extensions are identified. Please refer to draft-gu-network-monitoring-protocol for more work of control plane telemetry based on NMP(Network monitoring Protocol) which will be presented in GROW and OPSAWG.
- Section 3.4. Data Plane Telemetry:
  - Add 3.4.2. Technique Classification: Active and Passive, In-Band and Out-of-Band, E2E and In-Network, Flow-Path-Node
  - Add 3.4.3. The IPFPM technology: alternately mark the live traffic to perform packet loss, delay, and jitter measurements.
- Section 3.5. External Data and Event Telemetry: use events that occur outside the boundaries of the network system to provide a strategic and functional advantage to management operations

Next Steps

- Solicit more comments and feedbacks.
- Refine the draft
- More cooperation