IAB NEMOPS Position Paper: Agile Incremental Driven Development for Network Management

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References: https://datatracker.ietf.org/meeting/121/materials/slides-121-nmop-ietf-yang-push-implementations-and-next-steps-01.pdf

20 years ago, with RFC 3535, requirements for next generation network management protocols were defined with the aim to overcome SNMP and CLI constraints.

20 years later, SNMP and CLI remain still dominant in network monitoring. Even though YANG caught traction in configuration, it merely did with monitoring.

5 years ago, IETF YANG-Push (RFC 8639 and RFC 8641) was specified to enable to subscribe to YANG metrics, but none of the major network vendors ventured for an implementation since alternative, propriety, non-standard YANG notifications such as gRPC or gNMI were already being implemented between 2015 and 2019 when IETF YANG push was still being specified.

Therefore, it is common for a network operator today that the time from subscribing to make YANG metrics accessible to network operations is measured in days, not minutes. Lacking an automated data processing chain and overhead in maintaining vendor specific data processing pipelines.

The consequence among all of this is that the term automation is considered for configuration, not for monitoring today.

Since 2022, in context of draft-ietf-nmop-yang-message-broker-integration, the use case of an automated data processing chain and a standard YANG integration layer in Data Mesh, network operator, vendors and academia evaluated IETF YANG-Push and non-standard YANG notifications implementations, started to address shortcomings and now moving forward to simplify IETF YANG-Push and work on implementations in parallel.

With Big Data capabilities, and Data Mesh for organizing data, evolving over the last 20 years, network observability, the process of observing network behaviors and symptoms based on operational network data holistically on all 3 network planes, has gained a lot of traction and is deemed to reduce alert fatigue caused by classical device

monitoring. IETF has published with [RFC 9232](#) an overview of Network Telemetry protocols. However, these protocols lack common meta data such as the device identifier where the information is being exported from or an observation timestamp when the metrics where observed, which makes it hard for a cohesive network observability solution to correlate the data accurately.

What becomes clear now is that IETF developed YANG-Push not according to the network operator's needs, nor network vendors constraints, nor considered where it should integrate to, and most importantly, it lacks an agile incremental driven development process.

With such a process, the user's needs, the requirements and use cases, would be put first and through an iterative process, minimal viable products are being developed and steadily improved. This allows at an early stage to have a working implementation and steadily develop and adapt over time. Applied research should be involved for hypothesis and experiments when new fields and areas are being explored.

Such a process proved with operational topics to be very successful in many other areas.

IETF requirements:

- User first. No requirements without use cases.
- Be dependable and predictable. Deliver scoped items in time with proven implementations.
- Assess outcome of minimal viable product (MVP) development before moving to the next.
- In 12 months, from one MVP to another. End of 2025, IETF YANG-Push MVP 1 is in production. End of 2026 MVP 2. End of 2027 MVP 3. The goal here is to strike the right balance between stability of IETF specifications and solutions, and the very agile, move fast and break things solutions popular in other development spheres.

IETF recommendations:

- Ensure that network operators are voicing their requirements and uses cases, and implementers review and suggest how this can be addressed best.
- Scope specifications in minimal viable products and prove with running code in production environments. I.e., carefully balance the complexity of any solution, and the additional cost of implementation, relative to the benefits that it brings. Better to err on the side of simplistic, unless and until it is shown that the additional complexity is absolutely required.
- Adapt IETF process to enable agile incremental driven development.
- Set clear and doable milestones and progress accordingly. Monitor deviations and act.
- Communicate with your users and your implementers. Describe which MVP addresses which needs. Which specification specifies which MVP. Which implementation supports which MVP.
- Specifications supported by free to use open-source implementations of the tooling is likely to greatly quicken the adoption and deployments of the technology. In a space, where IETF is competing with industry provided solutions, easy or use and availability of solutions is critical.
- Consider agile incremental driven development process also for YANG module development. Making IETF YANG modules earlier available and easier to use in a multivendor environment compared to vendor specific modules.
- Consider encouraging better interaction between IRTF and IETF on network management. Where network operators at IETF define requirements, IRTF does hypothesis, experiments and IETF reviews results, conclude and set next steps together.