

NEMOPS: RFC3535 and the forgotten word

Or

Provisioning is only a subset of Network Management

A Network Operator's perspective (Deutsche Telekom – global IP Backbone)

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The outcome of RFC3535 is widely visible in today's networks. After the IAB-Workshop in 2002 began a huge step away from traditional CLI-based towards easier programmable Network Management. Today there are lots of different possibilities and the industry formed the term API-driven Management. This was made possible by the development of Netconf and YANG. Especially YANG as an easy-to-use data modelling language created a lot of traction in many parts of the networking sector.

Provisioning

Since quite some years now, service provisioning is easily possible in YANG for many, if not all of the main vendors in the industry. Coming from CLI, it is still a challenge, the learning curve is steep, but it is possible to master YANG fast. There are models available to configure what's necessary. Existing service "models" can be rewritten in YANG in no time. New services can/should be modeled directly in YANG.

Just looking at Provisioning, RFC3535 started a huge success story. Over the last 20 years, device configuration evolved from "complex dark caves to modern motorways" – easy to use and navigate.

Provisioning in reality

However, an operator always needs to be aware of the state of his network. He must be aware if the change can be executed – not only on the involved devices, but also the complete network (which also involves different layers). Normally a change of configuration also leads to pre-and post-checks, at least on device level, for operational states. While the configuration can be done via Netconf/YANG, there are still states that are not modeled yet. For commonly used features and commands, all operational states are available, but drilling deeper into the specialties of a device, falling back on CLI is still inevitable (Yes, in 2024, CLI. Is. Still. The. Only. Available. Solution, sometimes).

Monitoring

This finally leads us to the missing word, stated in the headline. When performing a quick search on RFC3535, configuration is mentioned 60 Times. In contrast, operational is mentioned 7 times,

monitoring only 3 times – 2 times in the SNMP section and once in recommendations. While YANG led us also to new developments like gNMI, many other protocols have been developed to fill the gaps for monitoring purposes. So RFC3535 (means the operators) focused on configuration aspects of network management, OBSERVABILITY was highly undermentioned. Monitoring is still the ugly, expensive thing, that costs a lot (of money, effort) and is often underrepresented in the daily business of managers.

Conclusion

With Big Data and AI at hand, operational data finally got a lot of traction outside of the traditional usage for network management. gNMI as an example was a first and quick way to support all use cases, that came up. However, IETF should focus more on operational data aspects – also to drive development of the internal device structures. While we can compute with nearly endless resources outside of routing hardware devices, they internally face a lot of bottlenecks to push the huge amount of information to the outside world.

Also, if we take the term “Intend based networking” [RFC 9315] – it is more a synonym for intelligent device/service provisioning. But for operators it should be the term that oversees the whole network. If we really want to come to closed loop automation, we need more than just YANG to reconfigure devices automatically. There must be enough information to come to data driven decisions, which then ends in closed loops that solve (or prevent) incidents. YANG so far modernized fulfillment of intended network changes. Assurance, that the changes have been configured and act as intended (across different layers, if different layers are impacted by a change), is still missing and should be in the focus of future standards IETF activities. Only then closed loop network automation can be reached.

After having successfully innovated network fulfillment standardization, future IETF network management activities should additionally emphasis more on network management assurance. If “fully automated networking” without a vendor lock is on the network operator’s agenda, they must contribute significantly to upcoming IETF operational assurance standardization.