What Gains for DevOps in Telecom Software-Defined Infrastructure?

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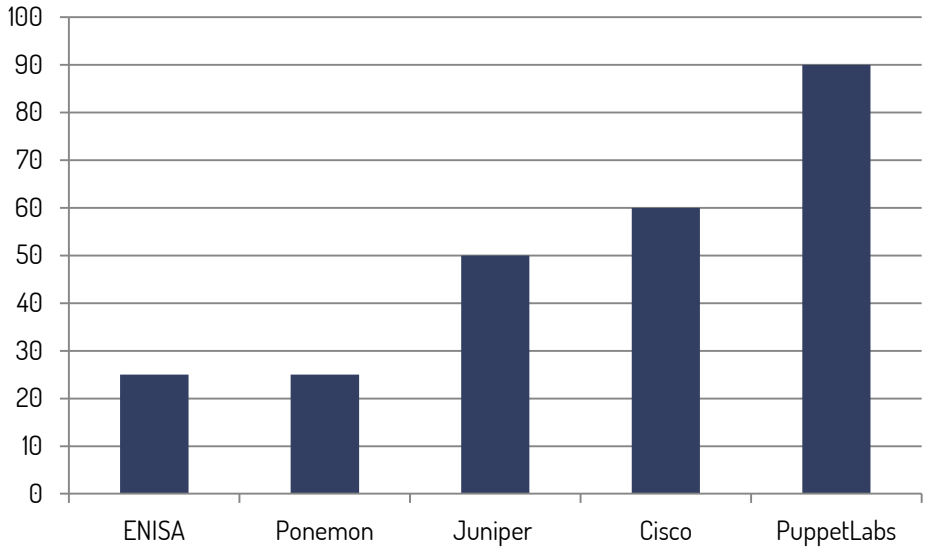
DevOps in telecom software-defined infrastructure

- Research challenges described in draft-unify-nfvrg-devops
  - Organizational challenges: roles of personnel - Developers (for Services and VNFs), Operators, System Integrators
  - Technical challenges:
    - CAP
    - Monitoring
    - Verification
- Datacenter DevOps tools (Ansible, Puppet, Chef, Splunk) reportedly being used in both research proofs of concept and production

Human error in IT and Telecom incidents



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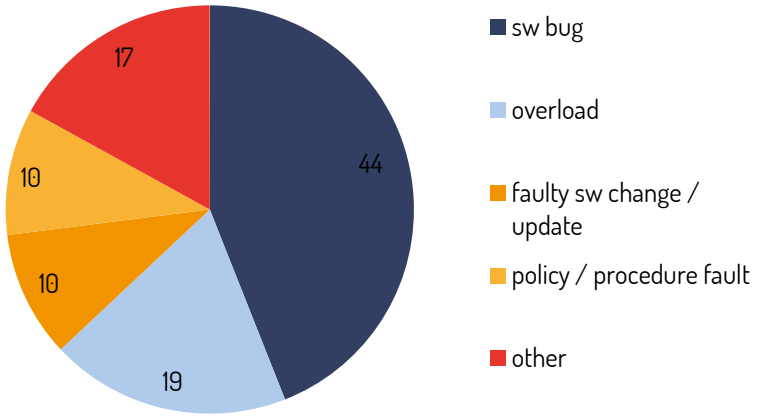
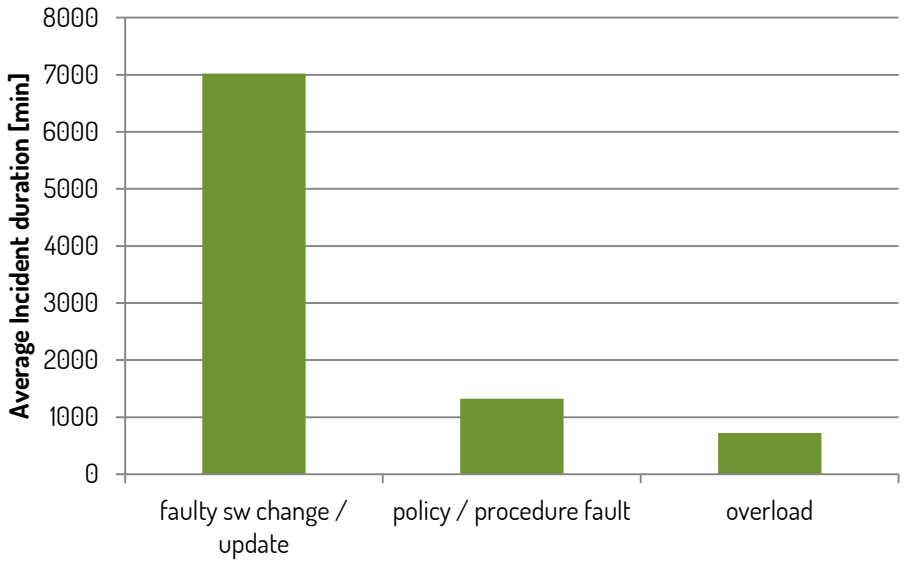
ENISA Annual Incidents Report: Type and duration of Mobile Internet incidents





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DevOps reducing human error rates

- Automation
  - Provisioning performed by controllers and orchestrators driven by scripted templates
- Verification
  - Check compliance with policies before and after deployment
    - Parameter ranges
    - Properties such as lack of forwarding loops or constraints regarding what functions may follow each other in a forwarding graph

DevOps reducing overload incidents

- Observability
  - Predict risk of overload network-wide by monitoring each port
- Policy-driven automated actions
  - VNFs that include overload protection features
  - Automated scale-out burst capacity provisioning and activation

The UNIFY project in a nutshell

- Help operators increase the velocity of service introduction
- In WP4, novel observability and verification features usable by both Developers and Operators
- Open source tools at https://www.fp7-unify.eu/

UNIFY DevOps Results

- Scalable congestion prediction: RateMon
- Service graph configuration verification: VeriGraph
- Verification of path functionality and consistent SDN updates
- Workflow engine for debugging and troubleshooting: EPOXIDE
- OpenFlow forwarding verification: AutoTPG
- Expressing measurement intents, states and reactions: MEASURE
- Workflows defined for integration with orchestration

Predict network congestion with low overhead (MBs for 100000 ports)

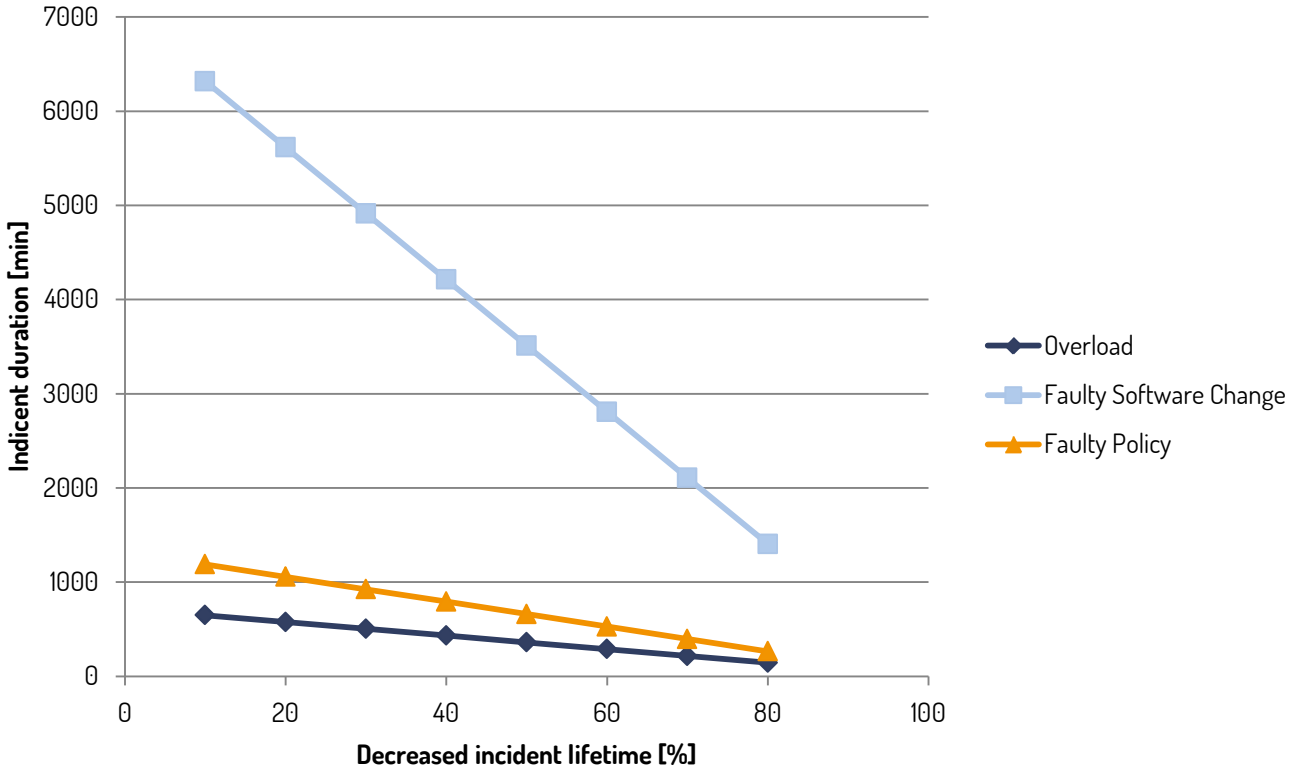
Consistent network updates

Formal verification pre-deployment and post-deployment checks and automated validation

What potential for gains?

Some factors to consider:

- overload – accuracy of prediction, time gained through prediction, support for overload protection in VNFs, reaction time for scale-out
- faulty software changes and policies – self-describing policies vs. manual modelling, modelling errors, ratio of parameters covered by the verification capabilities



Baseline: incident lifetime from the ENISA report

Conclusion

- Significant gains are possible in terms of reducing the number and duration of incidents
- DevOps tools help through automation, better observability and integrated verification
- Defensive programming of VNFs and infrastructure agility required to complement these tools

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