



# A DevOps Toolkit for Networks

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# Motivation

- Research challenges described in draft-unify-nfvrg-devops
- Allow the community to experiment with research results
- Get additional feedback
- Potentially gauge levels of interest in hardening and transitioning some of these tools towards production

# The UNIFY project in a nutshell



## Major Service Providers:



## Research Institutes:



## SMEs:



## Major Vendors:



## Universities:



- Help operators increase the velocity of service introduction
- In WP4, novel observability and verification features usable by both Developers and Operators

# The UNIFY DevOps Toolkit

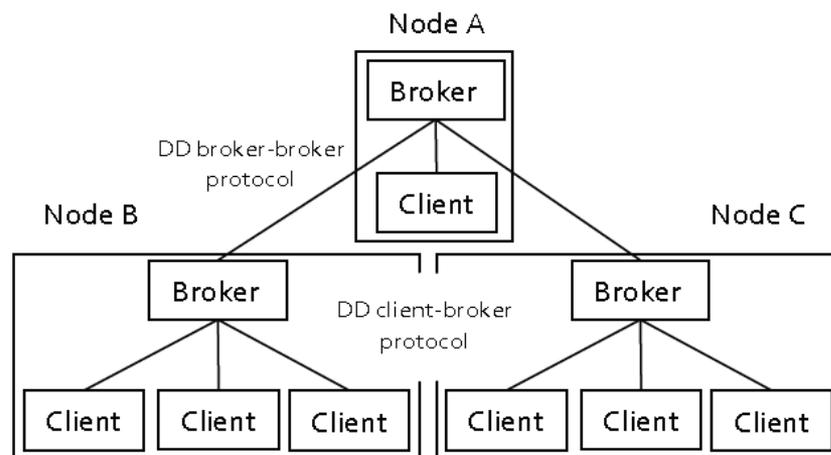
- Is
  - A collection of tools and supporting functions released under individual licenses
  - Provided as-is, with no guarantees
  - Supported by the respective authors' personal best efforts
- Is not
  - Production-ready
  - Optimized for all potential use cases

# Components, v1.0, available today

- Support functions
  - Communication bus: DoubleDecker
- Tools
  - Debugging and troubleshooting: EPOXIDE
  - Observability: Rate Monitoring
  - Verification: AutoTPG

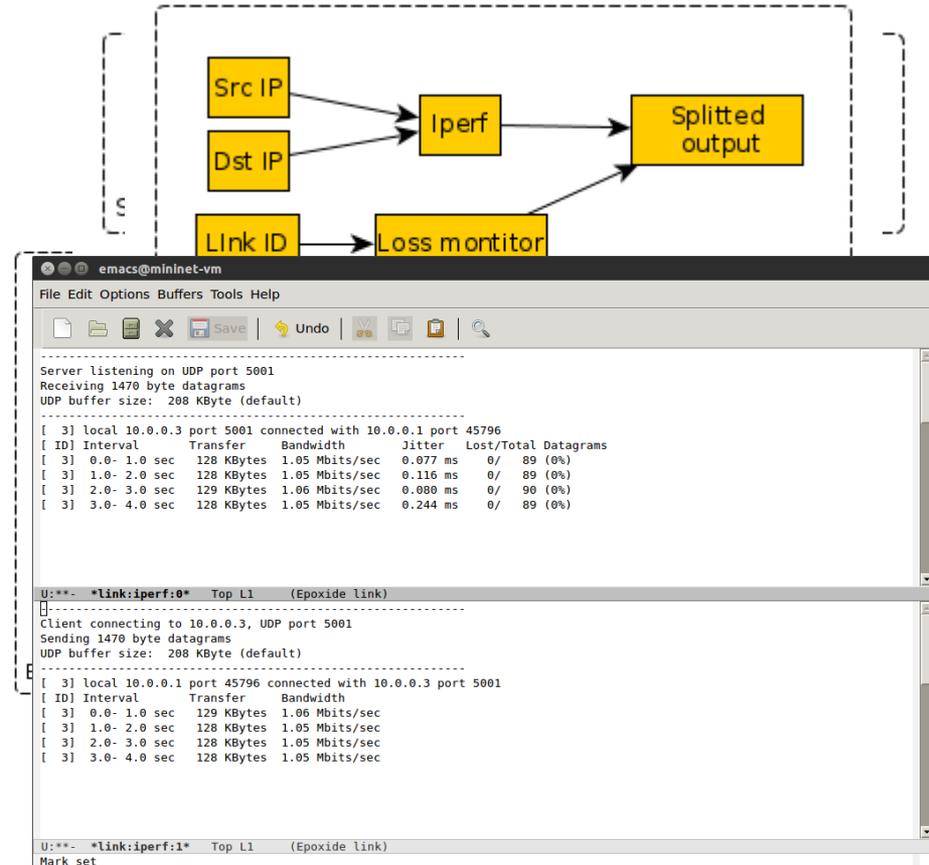
# DoubleDecker

- Provides scalable communication services for monitoring functions
  - IP and IPC transport
- Based on ZeroMQ
  - Lighter-weight than RabbitMQ or Kafka
  - No persistence
- Features
  - Client and broker hierarchy
  - Simple routing mechanism
  - Isolation mechanism for multi-tenancy
- <https://github.com/acreo/doubledecker>



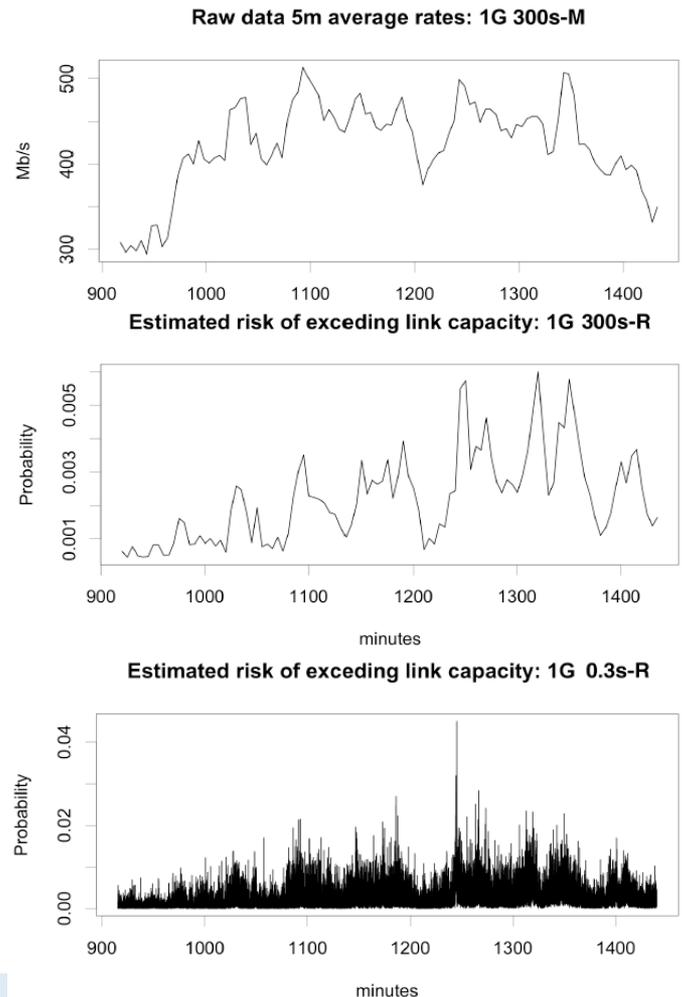
# EPOXIDE

- Troubleshooting framework integrating other tools in TroubleShooting Graphs (TSG)
- Based on EMACS
  - Nodes and links of TSG are shown in buffers
    - semantic navigation
    - navigation in a visualized TSG
- Event driven framework
- API for third-party tool developers
- <http://github.com/nemethf/epoxide>



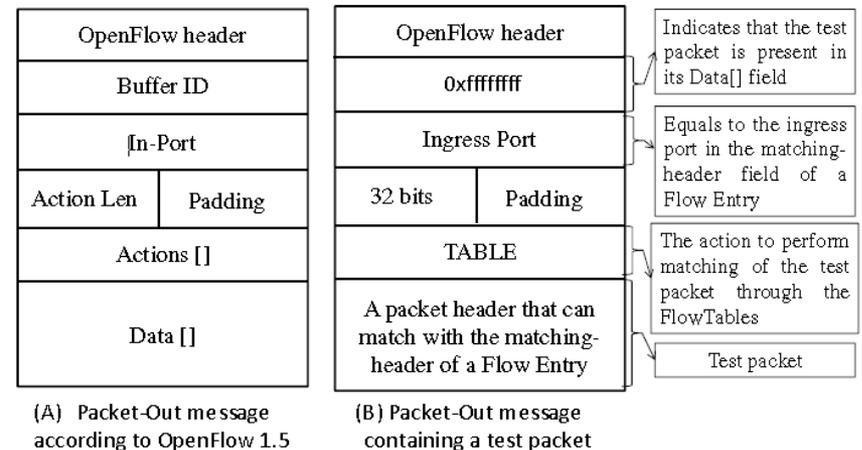
# RateMon

- Scalable congestion detector based on reading switch port utilization counters
  - use two counters (first and second statistical moments for link utilization)
  - transmit only the estimate to the controller, instead of high-speed data flow
  - message rate reduction 3000x compared to using raw SNMP counters directly
- <https://github.com/nigsics/ramon.git>



# AutoTPG

- Verifies FlowMatch part of OpenFlow descriptors, in particular for aggregated flows
  - Automatically generates test packets for entries under test
  - Binary search for matching error identification
- Identifies
  - Incorrect configuration
  - Bugs in OpenFlow switch implementation
- OpenDaylight application
- <http://users.intec.ugent.be/unify/autoTPG/>



# Conclusion

- First version of UNIFY DevOps Toolkit for networks released today
  - individual licenses for each component
  - DoubleDecker: scalable communication bus aimed at transporting monitoring data
  - Rate Monitoring: scalable congestion detector
  - EPOXIDE: framework for integrating troubleshooting tools
  - AutoTPG: verification of aggregate OpenFlow descriptors
- Next steps
  - Looking forward for feedback
  - Add more tools in Spring 2016
    - Verification of Virtual Network Functions
    - Language for describing monitoring intents in conjunction with Network Function Forwarding Graphs

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