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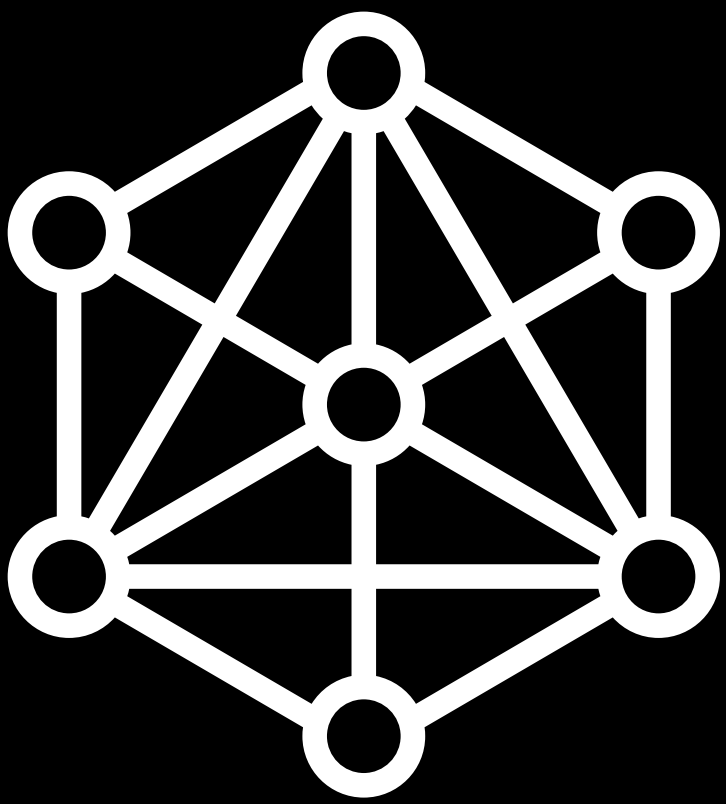
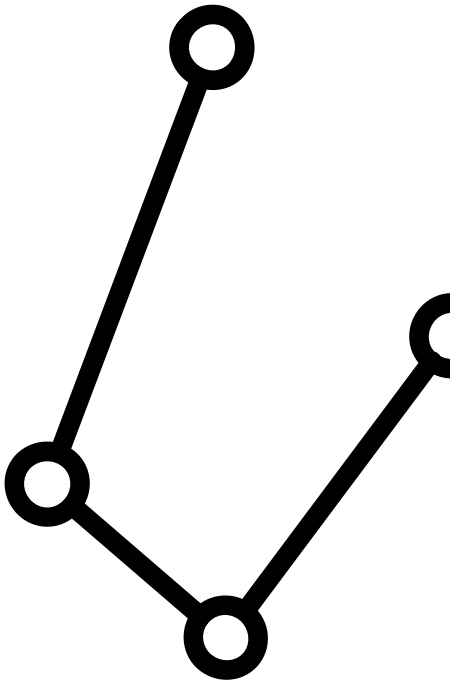
INSIGHT

GREEN-FIELD AND BROWN-FIELD SIMULATION OF NETWORKS

Simulation of network topologies to reach a precise view on lean router configurations, optimal distribution of caching systems and peering points.



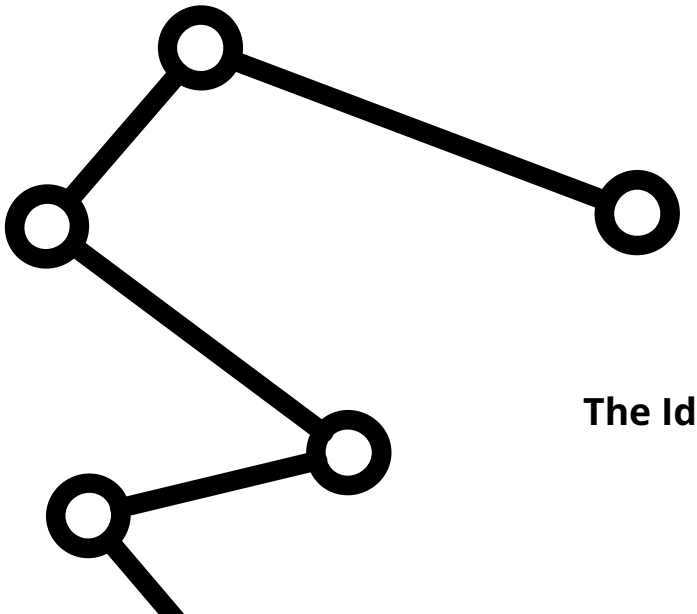
THE CHALLENGE



The continuously growth in data traffic is a real challenge for operators. Several services adding traffic to the operator's networks.

- **Streaming services like Netflix or YouTube**
- **Video conferencing like Teams or WebEx**
- **Online gaming platforms**
- **Social networks.**
- **Expectation is still, that some services will exponentially develop.**

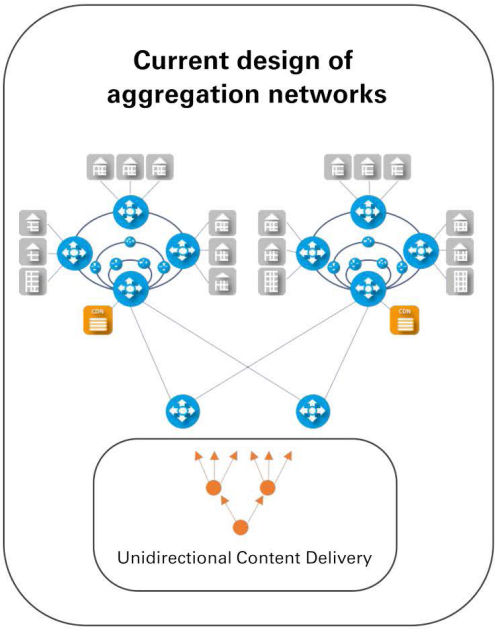
On top, web giants like Amazon and Google showing it is possible to save OPEX and CAPEX using Web Scale Technologies to deliver services, content and traffic. Operators must reconsider new network topologies, disaggregated infrastructure and smarter locations of caching systems to win the battle. However changes of this significance comprise risks which might lead to additional spending.

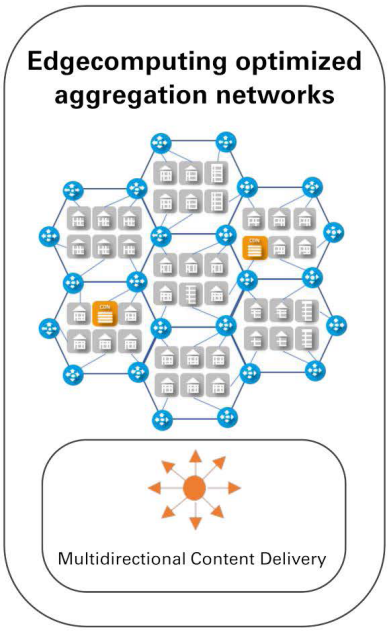


The Idea: The simulation of the network

REQUIREMENTS FOR THE SIMULATION

- Flexibility in simulating different network topologies
- Easy definition and configuration of traffic scenarios with different cache locations, varying service areas and traffic streams
- Usage of real router configurations including the real routing protocols, MPLS, BGP, etc.
- Flexible distribution of the data sources
- Graphical representation of network utilization over several years
- network Simulation of failure scenarios - at least node failure, link failure and data source failures - including the representation of how traffic flows and traffic loads change in the network
- Usage of virtual routers e.g. Juniper vMX as substitute for real MX960
- Flexible and automated configuration incl. Segment Routing, MP-BGP peering and MPLS forwarding
- Flexible traffic models 1:x



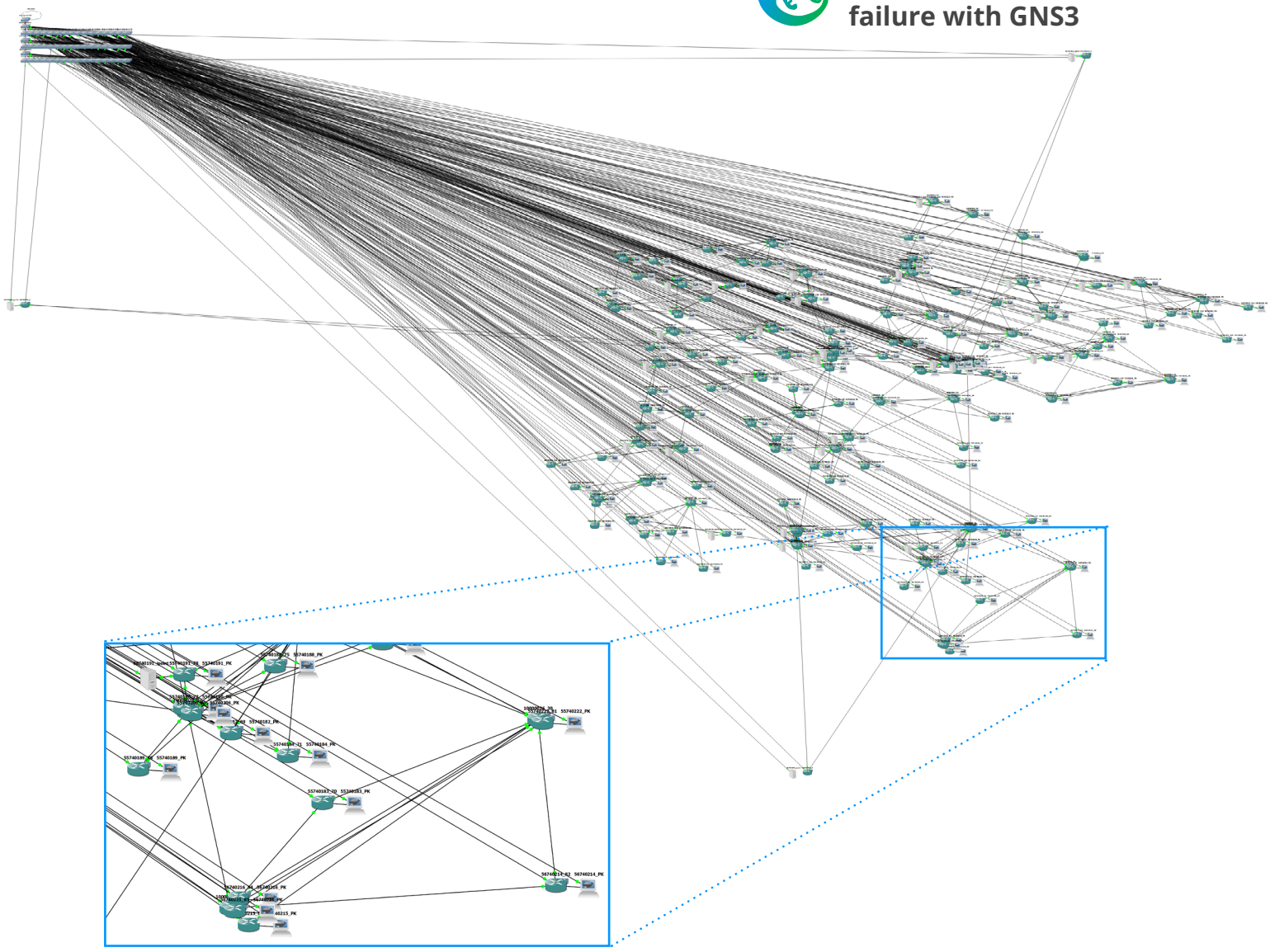


Simulation overviews and samples.

SIMULATION OVERVIEWS AND SAMPLES

Core of the solution is the graphical **network simulator GNS3**. Missing functionalities have been implemented in Python. Find below an example how it looks like in the GNS3 overview.

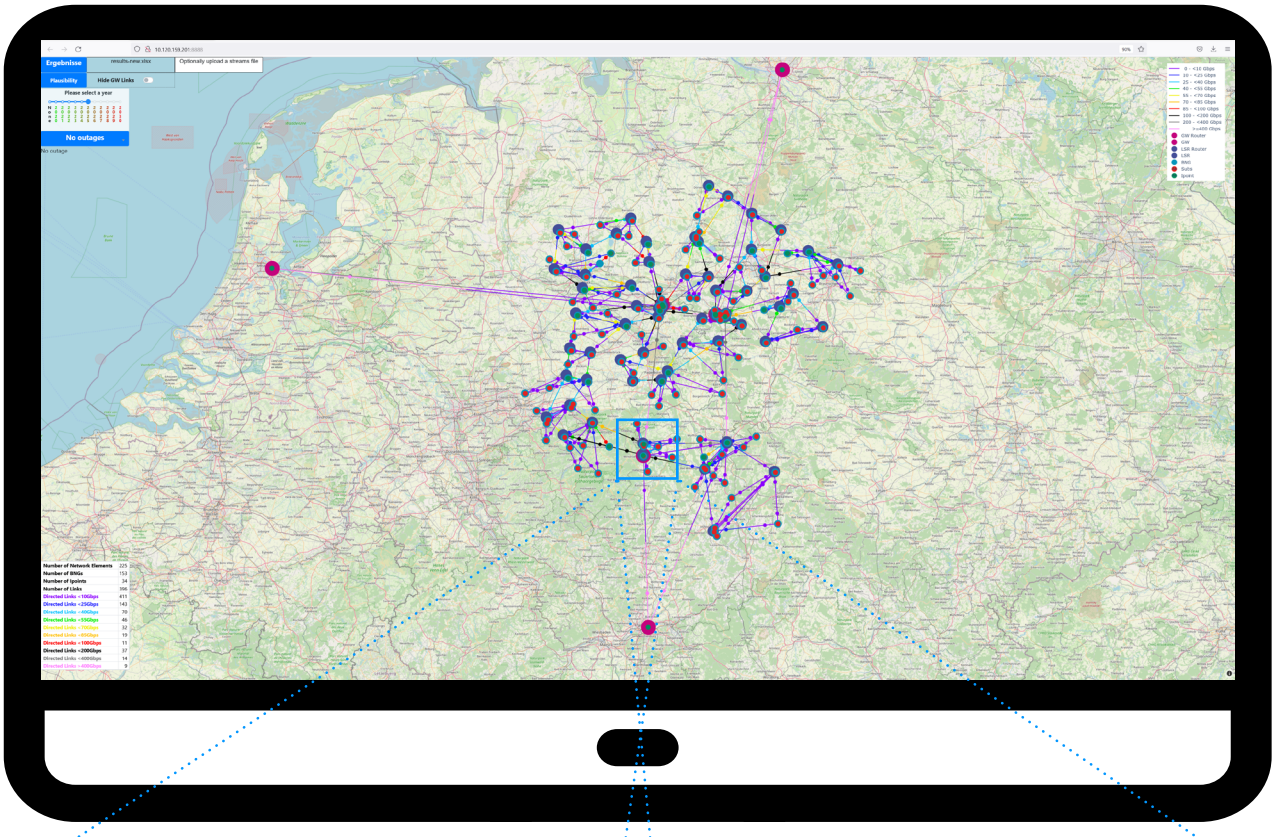
Visualization of the network load with link failure with GNS3

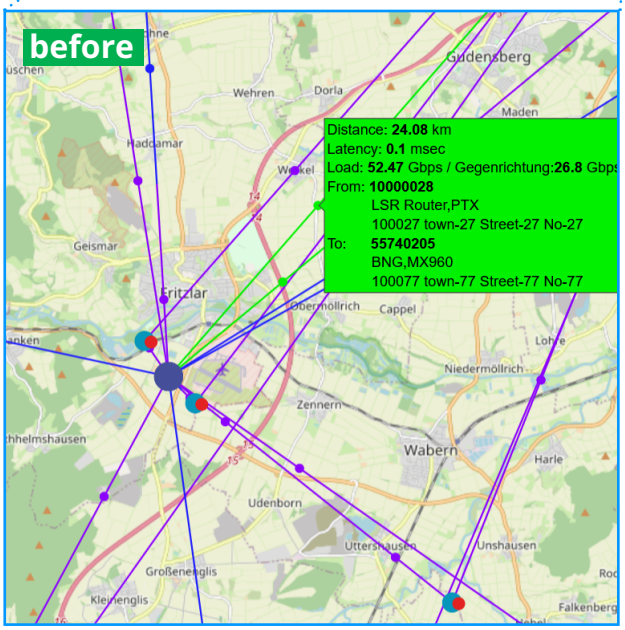


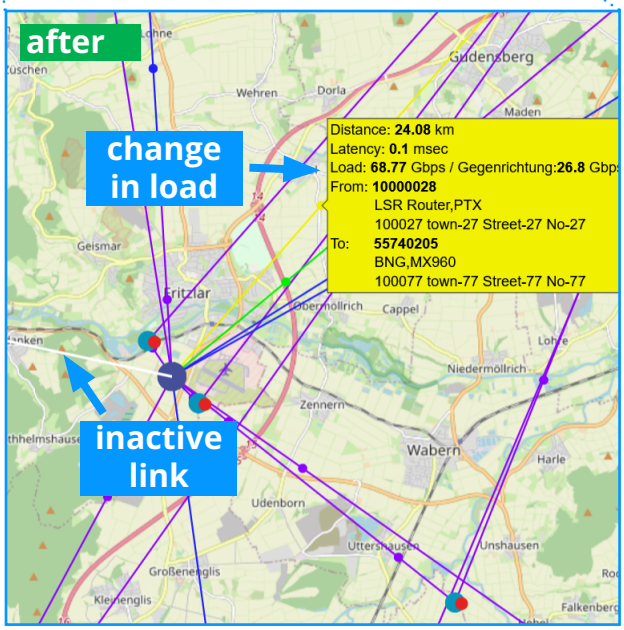
On the next page you can see a link failure scenario

LINK FAILURE SCENARIO

User Interface for topological representation of the network







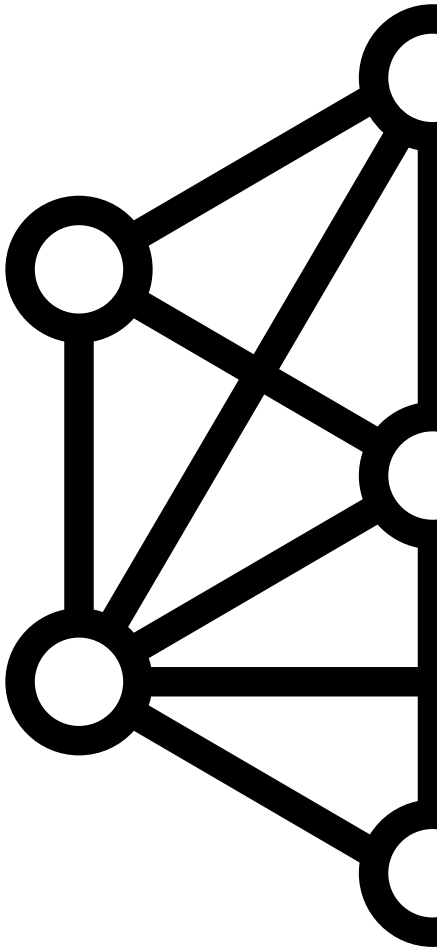
Detail monitoring before and after link outage

Findings and opportunities

FINDINGS AND OPPORTUNITIES

Overall the simulation gave a precise view on how cost savings can be reached by optimizing the network. The simulation succeeded and delivered answers and findings to:

- different traffic scenarios
- lean router configurations for the new network topologies
- optimal distribution of caching systems and peering points and their service areas
- network utilization over the coming years with the forecasted traffic growth identification of overload conditions
- different strategies for bandwidth management e.g. increase number of caches vs increase bandwidth on links
- network behavior in case of failures impact of the network architecture on the link utilization the mathematic models
- the right balance for the upcoming bandwidth planning
- Calculated latencies between traffic sources and subscribers or between any BNGs



It has been shown as well, that the solution is scalable and allows the automatic simulation of an operator network including various failure scenarios. Automated deployments of the necessary test resources, software and configurations made it easy and fast to test. On top, compared with traditional procedures the simulation saved OPEX and CAPEX spending.

Contact us and learn more about Your opportunities

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ABOUT SITICOM

siticom is a technology innovation company founded in 2010 with a focus on the digital transformation of infrastructure and networks of tomorrow. siticom's portfolio is geared towards the complex technological challenges of the future. The solutions and services range from technical and strategic advice to engineering services for planning and realizing network infrastructures in communication networks and corporate networks. Thanks to a highly innovative, flexible grid of system partners, siticom is able to implement high-quality solutions at short notice. The combination of consulting, design and architecture bundled with the assumption of system and implementation responsibility as well as test-automation distinguishes siticom as an independent system integrator.