



## Challenge: reliable network operation

- Enterprise networks are business critical
- Performance issues impact productivity
- Visibility of network state and traffic flows is mandatory

### Visibility with proactive monitoring

- Passive measurement of traffic characteristics
- Active measurements between network locations
- Tracking of component behavior

### Technical challenges

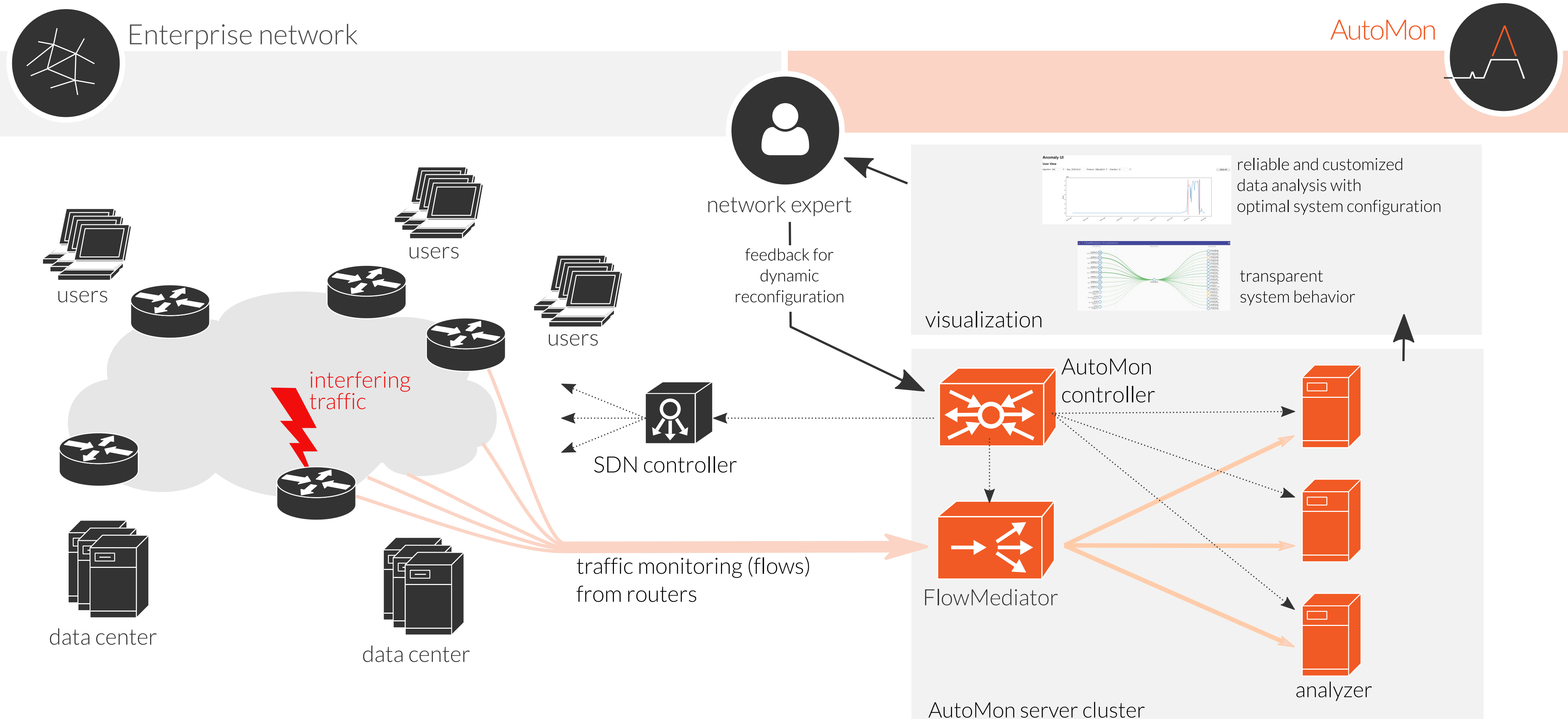
- Geographically distributed data collection and processing
- Up to 1 million flow records per second and location
- More than 10 billion records per day
- Record and data collection are vendor-specific

## AutoMon approach

Goal: closed-loop control monitoring system for automated troubleshooting

### Aspects

- Controller component to adjust the overall system
- Usage of data formats and models enabling semantic evaluation (IPFIX, Yang)
- Utilization of flexible configuration mechanisms (NetConf, RestConf, SDN controller)
- Rule-based algorithms and machine learning
- Topology-based root-cause analysis
- Adaptive data visualization
- Business intelligence analysis with external data sources



## Experimental systems and demonstrator

### AutoMon experimental systems

- Lab environments at research partners for functional testing
- Experimental environments at application partners
  - Data from productive systems
  - Feedback from network experts

### AutoMon demonstrator

- Dynamic system adjustments via API  
Example: Integration of a virtual assistant
- Traceability through interactive and real-time export topology visualization

## Project results

- Flexible data processing chain for heterogeneous input data
- FlowMediator for dynamic load balancing with topology visualization
- Novel sampling method for efficient delay measurement
- Anomaly detection with parameter optimization through training datasets (machine learning)
- Visualized data correlation with dynamically adaptable data import
- Algorithms for automated adjustment control
- Integration of an SDN controller