ZTN & gNMI

Zero Touch Network

&

gRPC Network Management Interface

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Google

The Zero Touch Network

Bikash Koley - 2016

International Conference on Network and Service Management

- Network Operation is a **tradeoff** between:
  - Scalability
  - Efficiency
  - Reliability

We want all three!

ZTN is...

Architectural principles:

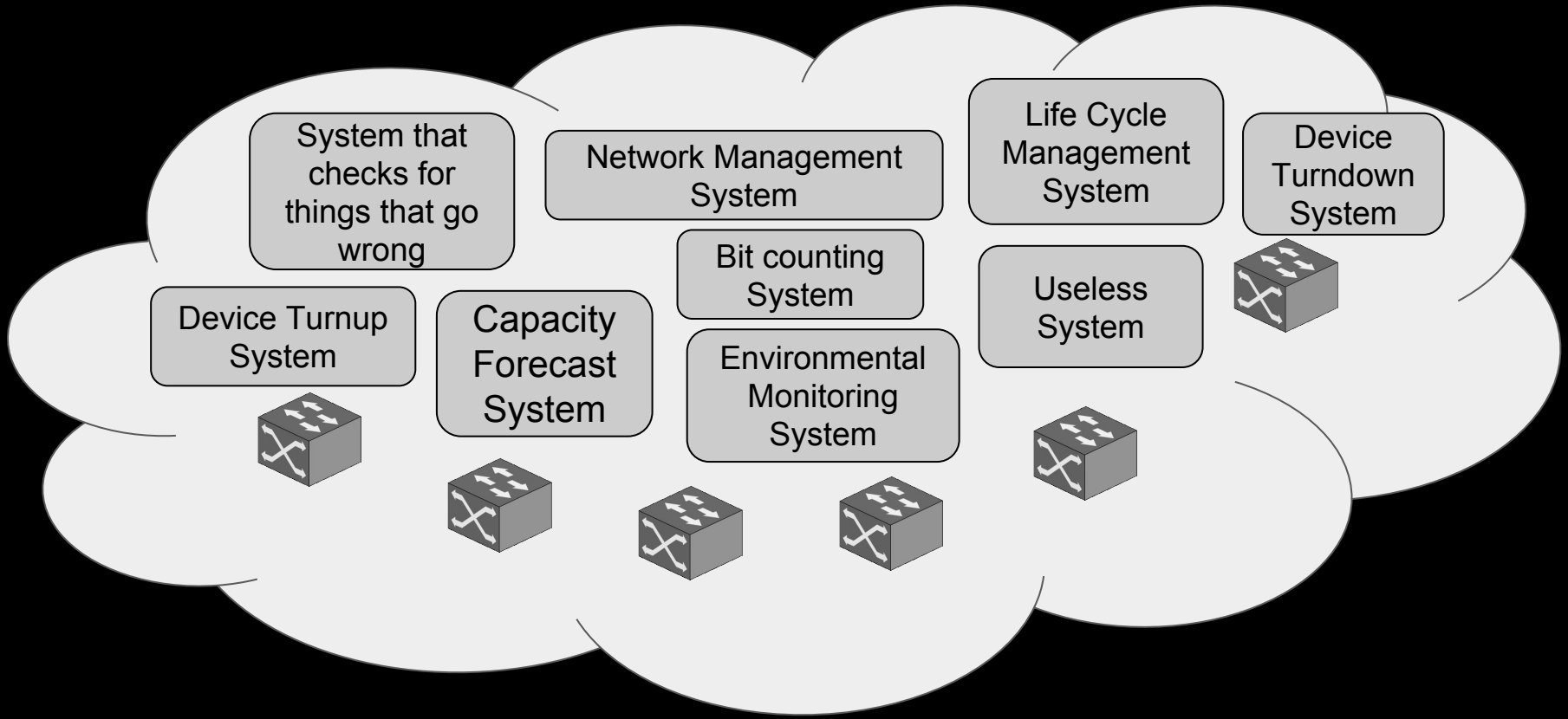
1. **All network operations are automated;**
2. The network infrastructure is fully declarative;
3. Changes applied to individual network elements are derived by the network infrastructure from the high-level network-wide intent;
4. <...>

What makes a system easy to automate?

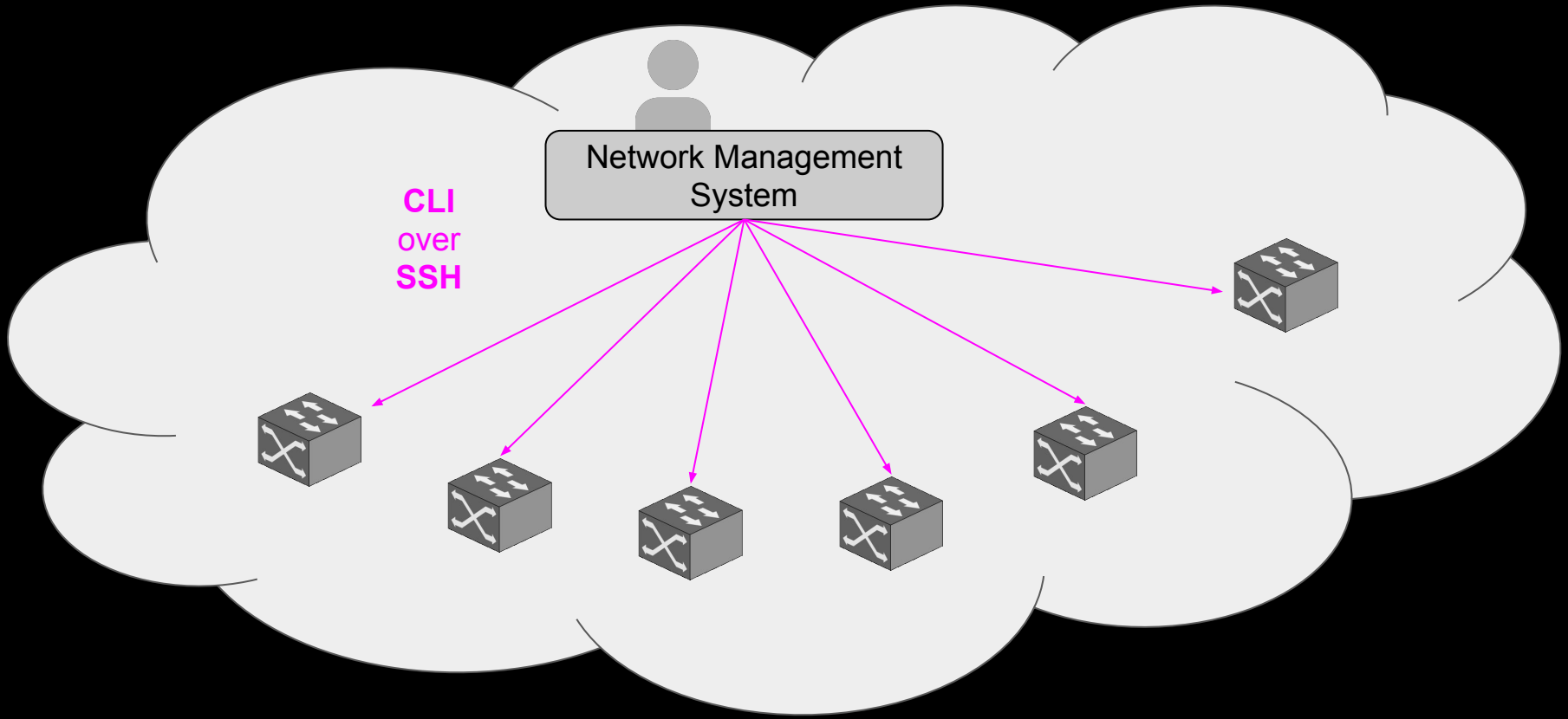
- A System that has:
  - well defined interfaces
  - well defined behaviours

- Side effect:
  - Very easy to test

My Network is my System



Well defined interfaces is often not the case



Why is the CLI not easy to Automate?

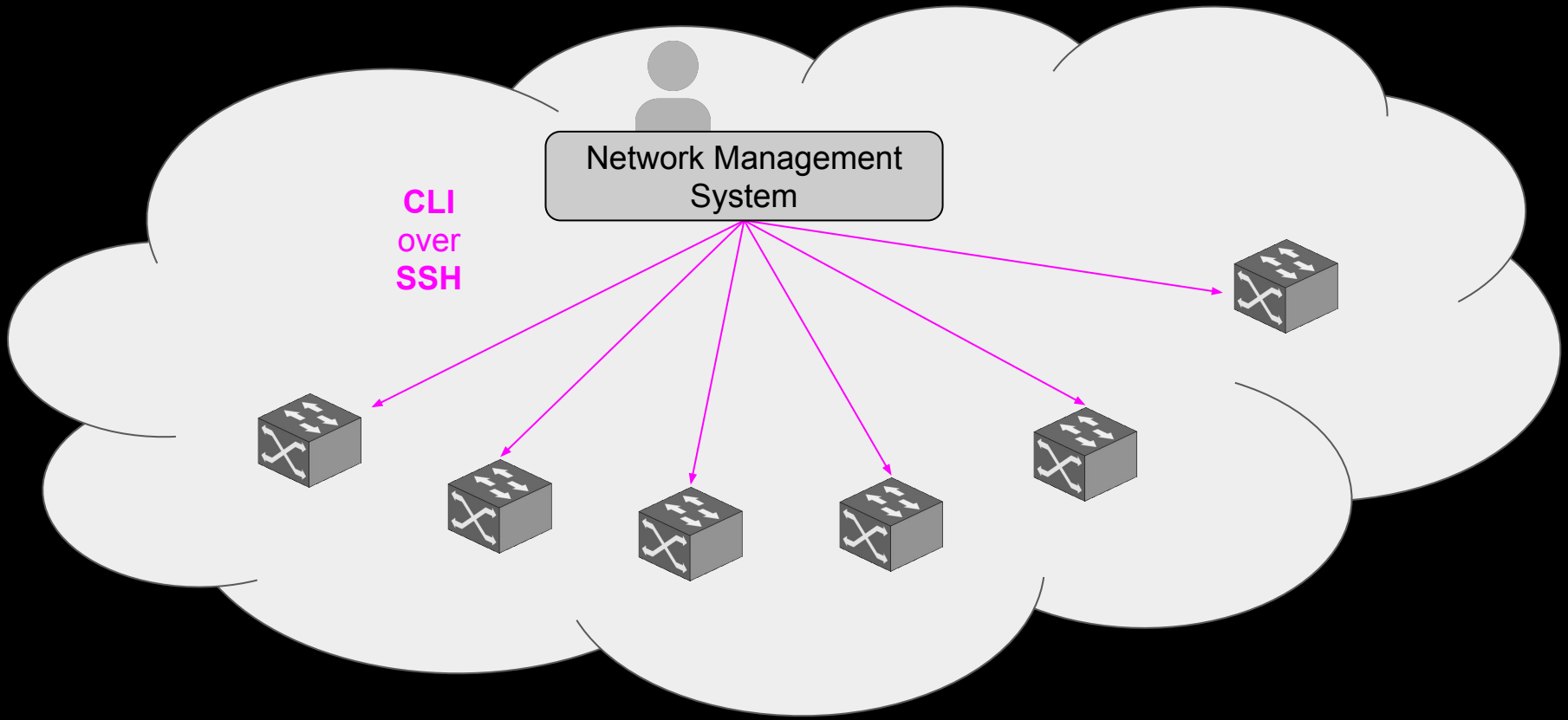
- lack of transaction management
- no structured error handling
- structure and syntax of commands keeps changing
- not programmable!

- Side effect:
  - hard to test

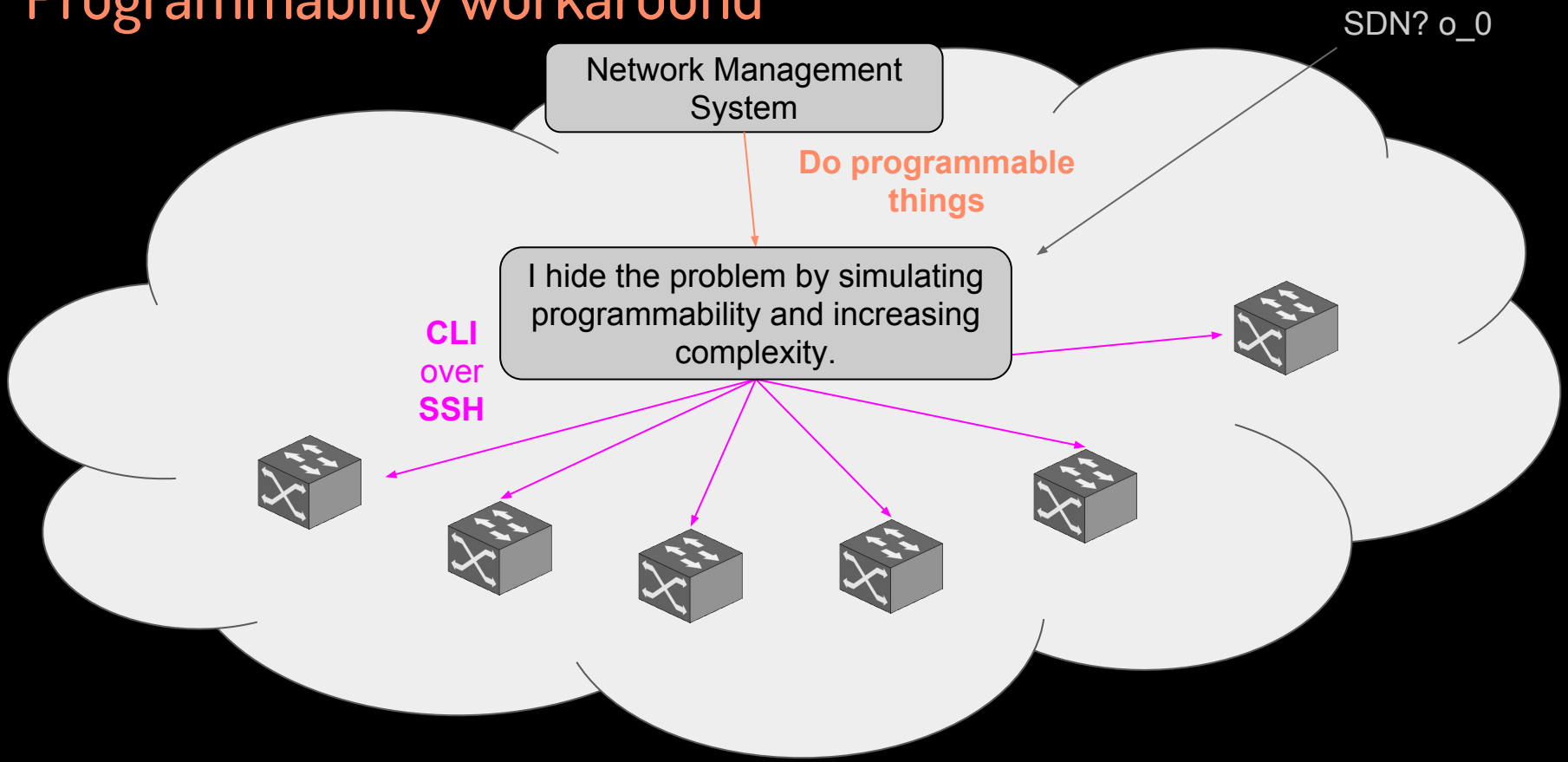
Processes hard to automate using CLI

- Listing Platform Hardware and Components
- Configuring features
- Upgrading Operating System
- Changing passwords
- Generating and Installing certificates
- ...

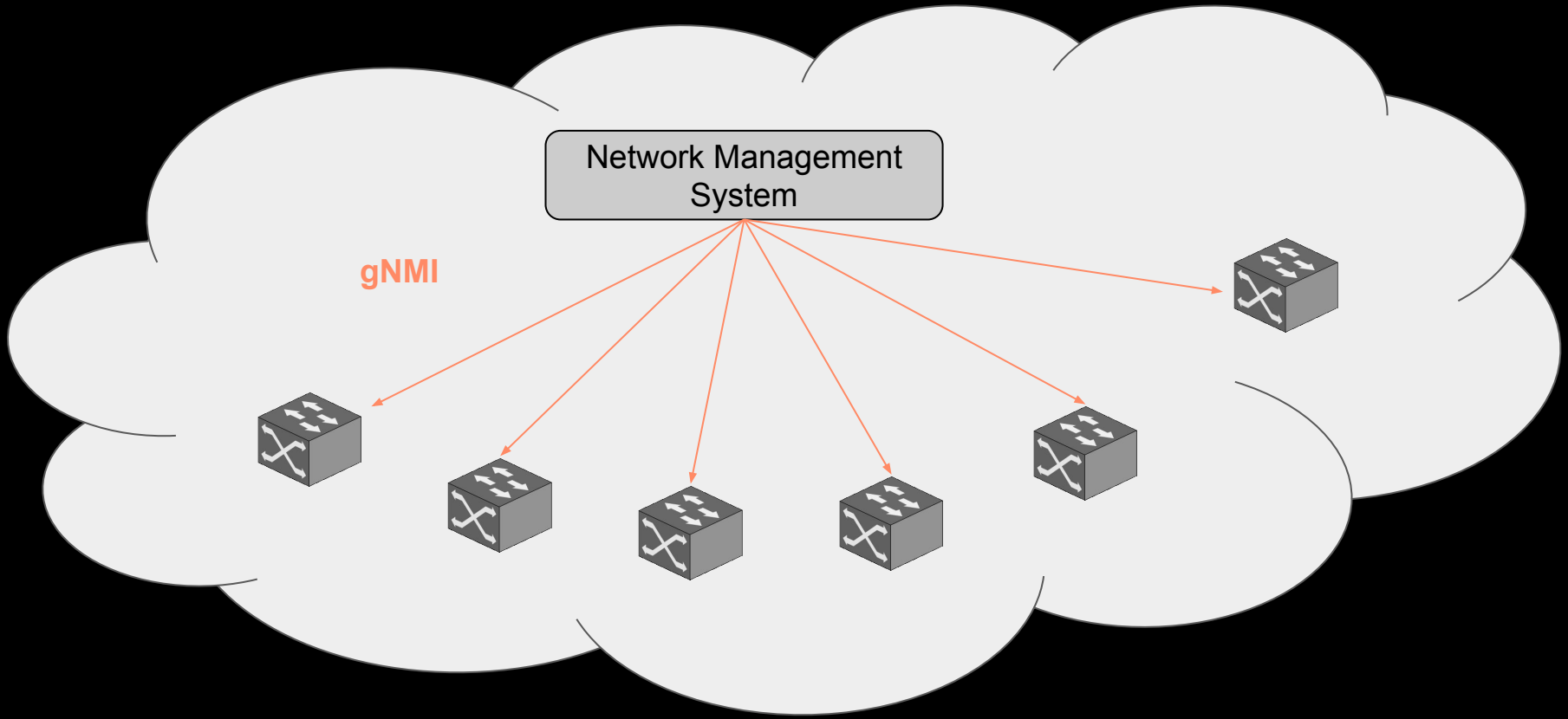
How to make it programmable?



Programmability workaround



Proposal - gNMI



gNMI decomposed

- gRPC - transport
  - encrypted, authenticated, compressed
  - high performance RPC framework that can run in any environment

- gNMI - action
  - Get/Set/Subscribe/Capabilities (Service definition with a proto file)

- Tree-structured data - properties
  - OpenConfig - YANG data models
    - Vendor neutral
    - Real use case driven

gNMI vs Openflow?

- Openflow -> Forwarding Plane
- gNMI -> Platform

gNMI reference implementation

github.com/google/gnxi

- Golang binary examples that do:
  - GET, SET & Capabilities (soon Subscribe)
- Target mock to test against

gNMI docker instance

github.com/faucetsdn/Dockerfile.gnmi

- Ready to test environment for gNMI.
- Test against a platform.

gNMI reference implementation testing

gNMI reference implementation testing

- ✓ Capabilities
- ✓ Get
- ✓ Set

- ✓ Capabilities
- ✓ Get
- ✓ Set

- ✓ Capabilities
- ✓ Get
- ✓ Set

Next Steps

- Add test cases to gNMI docker in FAUCET (CyberRFP)
- Implement:
  - Streaming Telemetry
  - gNOI
    - Certificate Management
    - Systems

Key takeaway

- Automation is fundamental for ZTN
- gNMI makes better automation than CLI
- We have vendor implementations of gNMI

Thanks