Cloud-based Testbed for Simulation of Cyber Attacks

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Part I

Introduction

Motivation

Current status

- Ubiquitous cyber attacks
- Need to be studied and understood

What do we need?

- Real-world arrangements simulation
- Sufficient isolation and control
- User friendly environment (easy to instantiate and use)

Requirements statement

- Network-related requirements
- Host-related requirements
- Monitoring infrastructure
- Control requirements
- Deployment requirements

Part II

Cybernetic Proving Ground

About

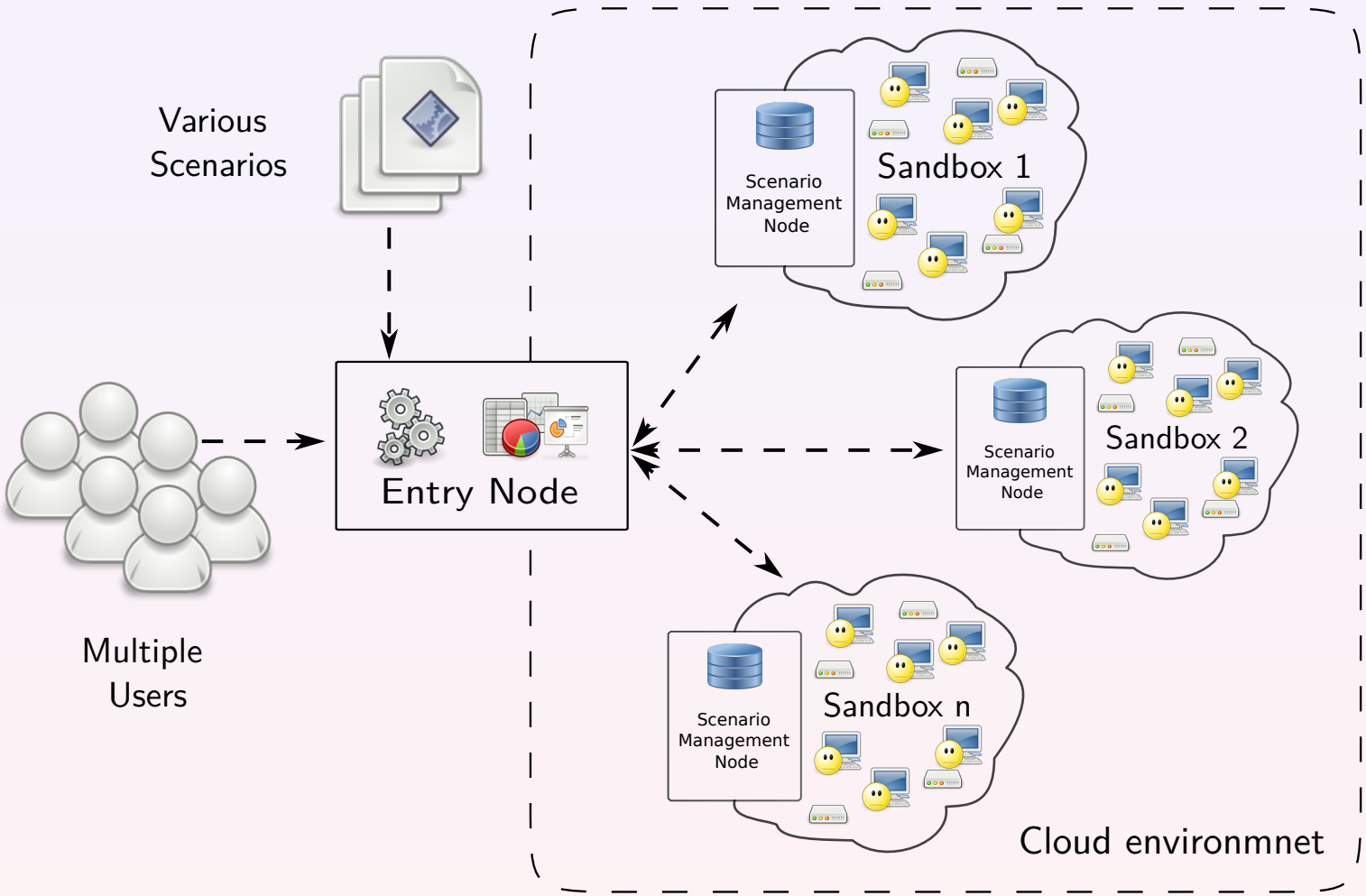
Features

- Simulation of a large network, systems, services and applications.
- Monitoring of network behaviour, detection and mitigation of anomalies and attacks.
- Cloud environment for repeatable investigation of cyber threats.

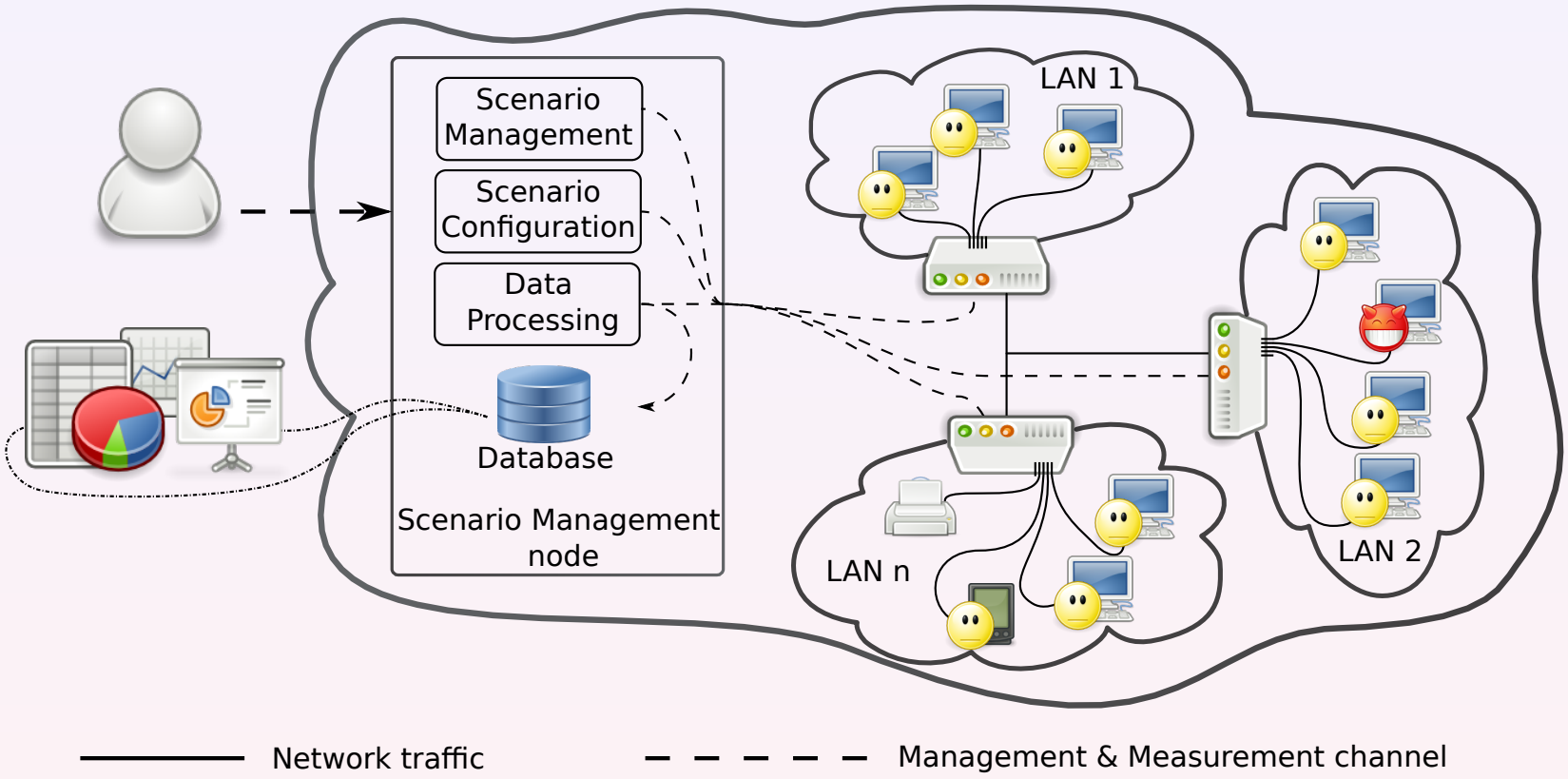
Cloud

- Enables computing of resource-intensive tasks.
- Remote secure access of users around the world.
- Enables providing CPG to third parties as a service.

General architecture



Sandbox architecture



Networking

ISO Layers

- L2 layer is provided by CPG
- L3 completely under user control

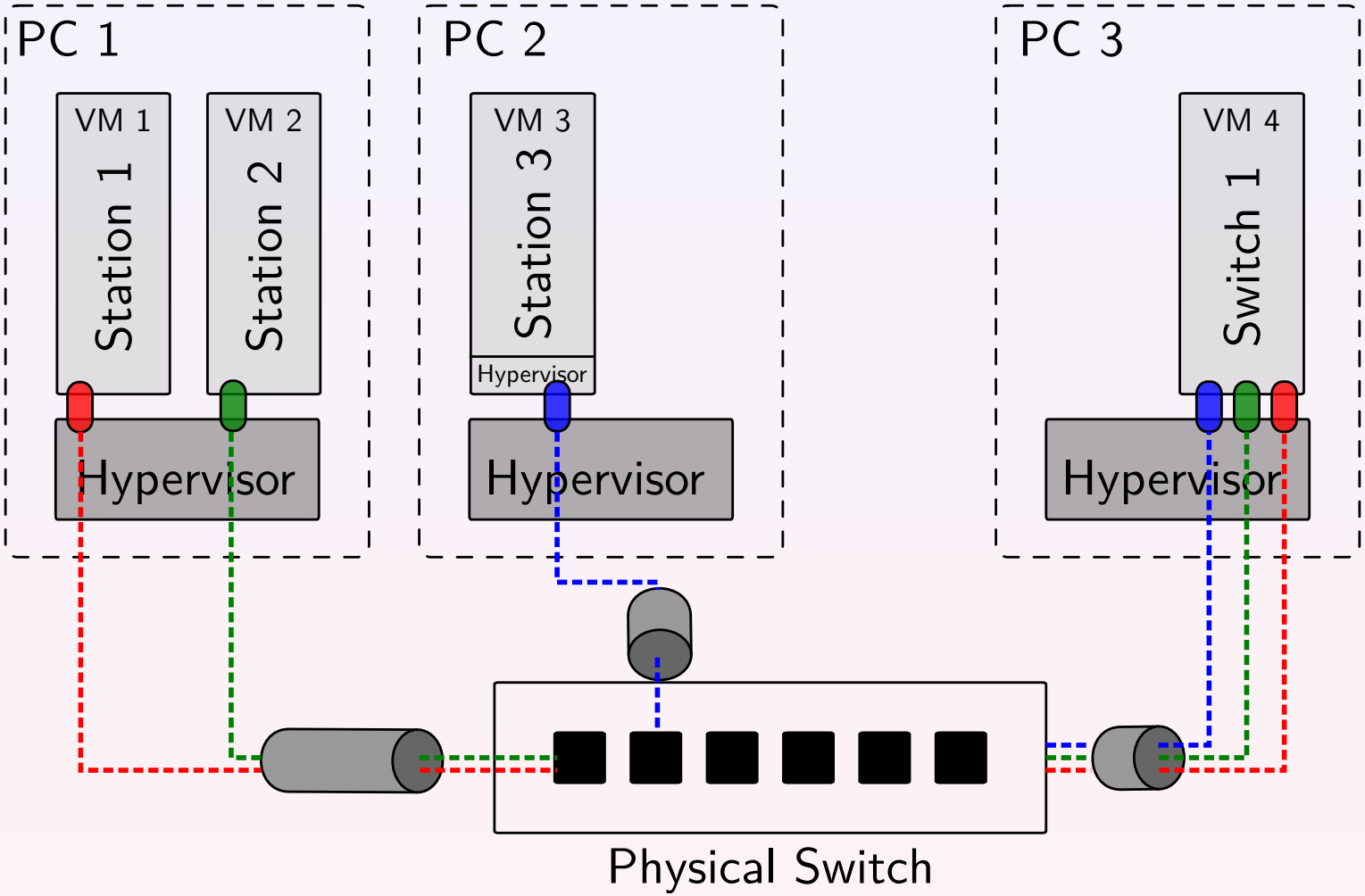
Flexibility

- IPv4, IPv6
- Non-IP protocols
- Emulation of various network characteristics (delays, bandwidth limits, dropped packets)

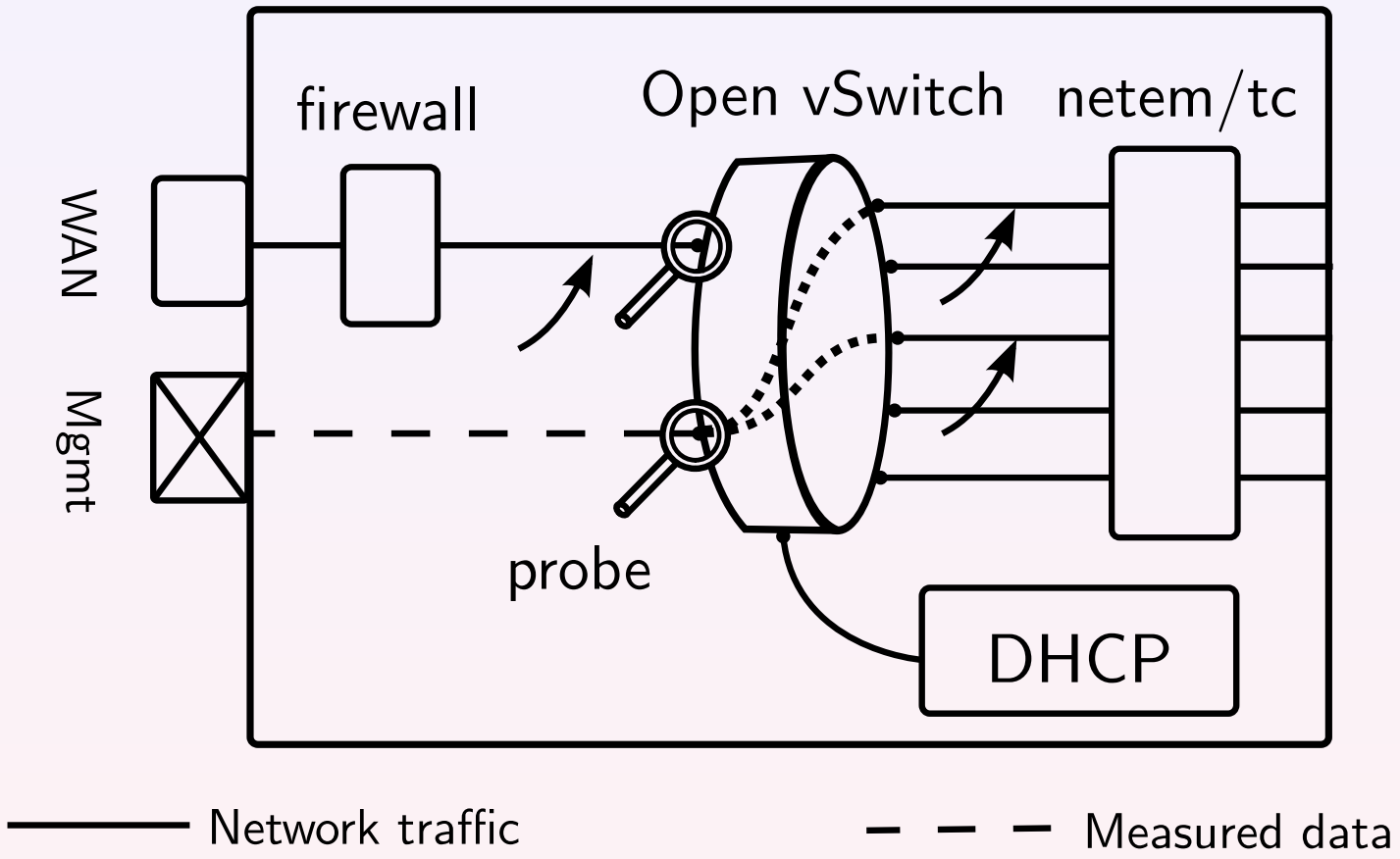
Components

- Management Network
- Simulated Network
- Lan Management Node

L2 Architecture



L3 Architecture



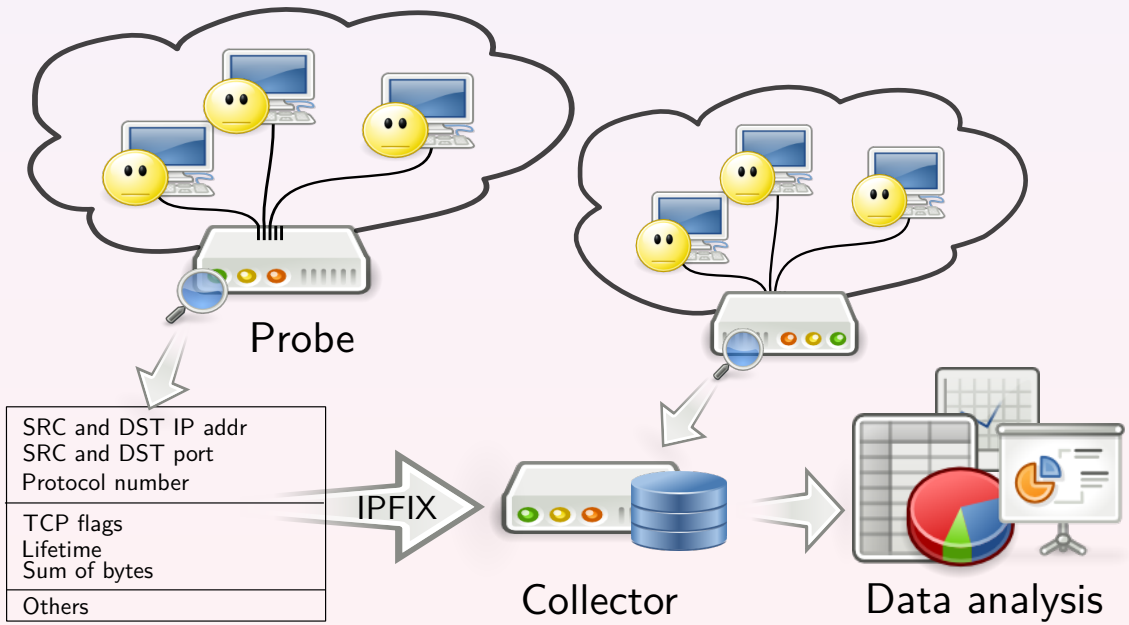
Monitoring infrastructure

Network monitoring

- Network flow monitoring
- Automatic configuration

Host monitoring

- Nested virtualization
- munin



Benefits for users

Easier investigation of cyber threats and attack

- Automated gathering and processing of data generated during security scenarios.
- Creating database of malicious code (malware, worms, botnets).
- Visualization of significant aspects of the scenarios.

Traffic analysis and forensics

- Acquisition, storage and analysis of network traffic statistics.
- Analysis of malware – at infected host as well as in network.
- Validation of processes of incident handling and response.

Part III

Use-cases

Security scenario

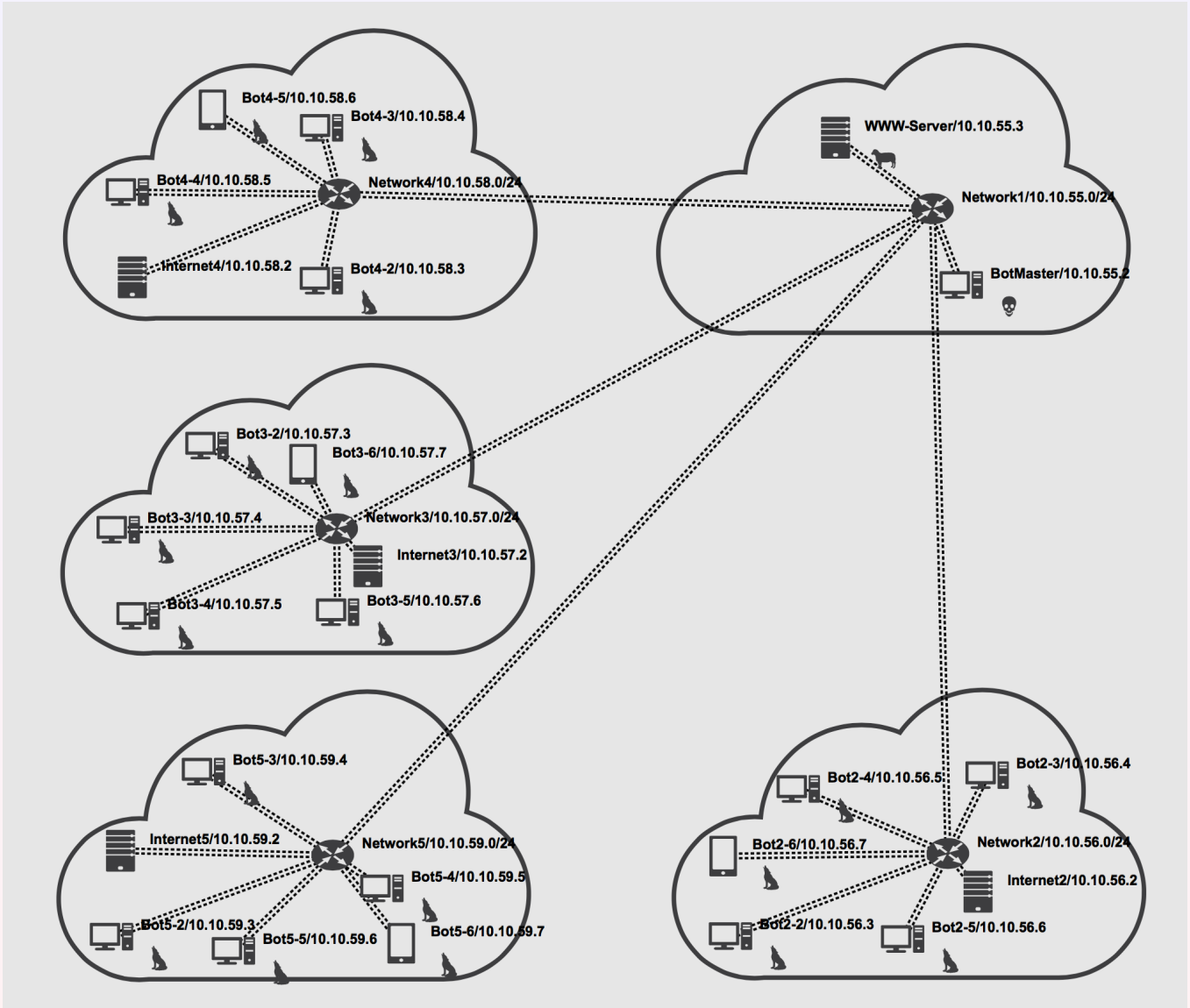
What is it?

- General description of environment, components, actions, expected outcomes of particular experiment

What does it consist of?

- Scenario description
- Technical description
  - Variation description
  - Network topology including node types
  - List of events
  - List of actions
  - Characteristic manifestations

Simulation of DDoS



Work in progress

Attacks to critical infrastructure: Domain Name System

- Testing tools
- Research and development

Forensic analysis of infected files and applications

- Observation and monitoring of captured artifacts
- Scenario repeatability

Penetration testing

- Testing of detection tools
- Training of penetration testers

Future work

Training of security teams

- Commented analysis of scenarios
- Cyber war game in CPG

CPG as a service

- Remote access to CPG to third parties
- New scenarios “on demand“

Thank You For Your Attention!

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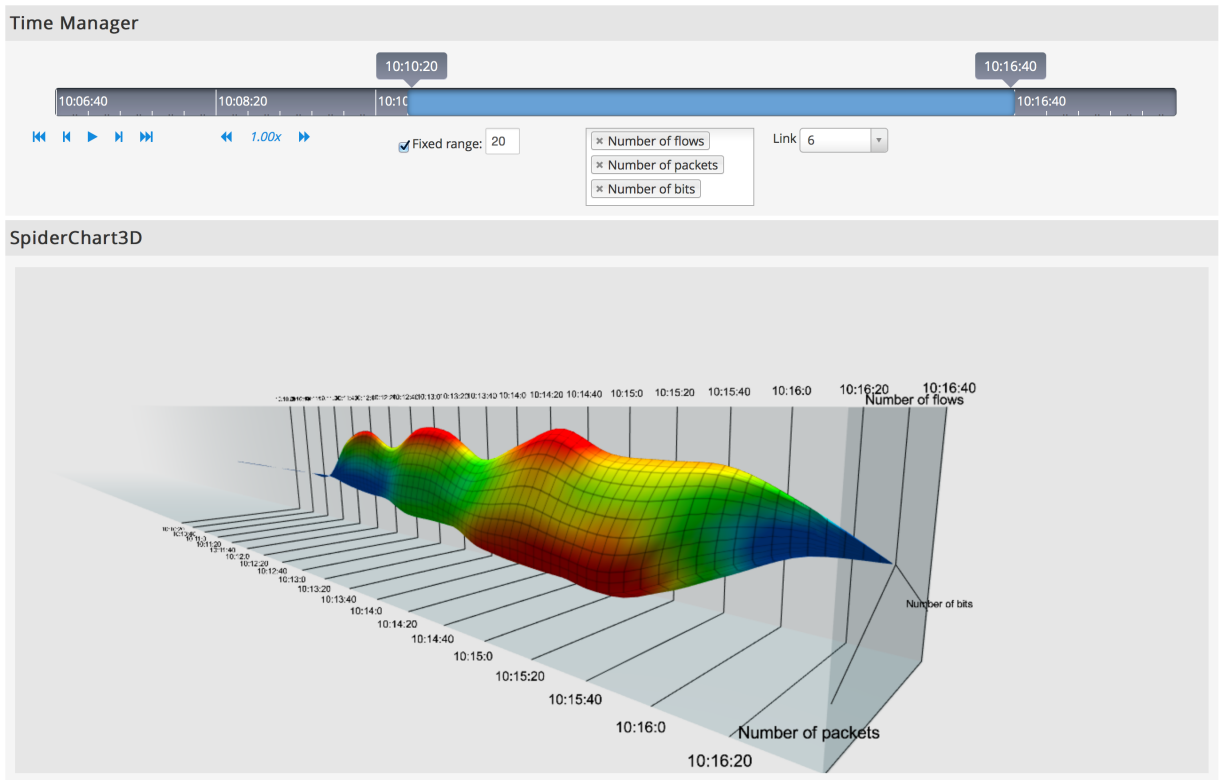

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