A Distributed Network Telescope in the FABRIC Infrastructure

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Paul Barford
Computer Sciences
University of Wisconsin

FABRIC

THE UNIVERSITY of WISCONSIN MADISON

Background: the NSF FABRIC testbed

- **A new, nation-wide programmable network testbed**
  - **Launched in 2019 via $20MM NSF grant**
- **Significant compute and storage at each node location**
  - **GPUs, FPGAs, and network processors (NICs) inside the network**
- **Dedicated optical infrastructure connects national facilities**
  - **HPC centers, cloud & wireless testbeds, commercial clouds, the Internet, and edge nodes at universities and labs**
- **Allows users to design and test applications, protocols and services that run at any node in the network**
- **Science drivers: security, IoT, ML in the network, NDN, advanced transport protocols**
- **See https://fabric-testbed.net/**
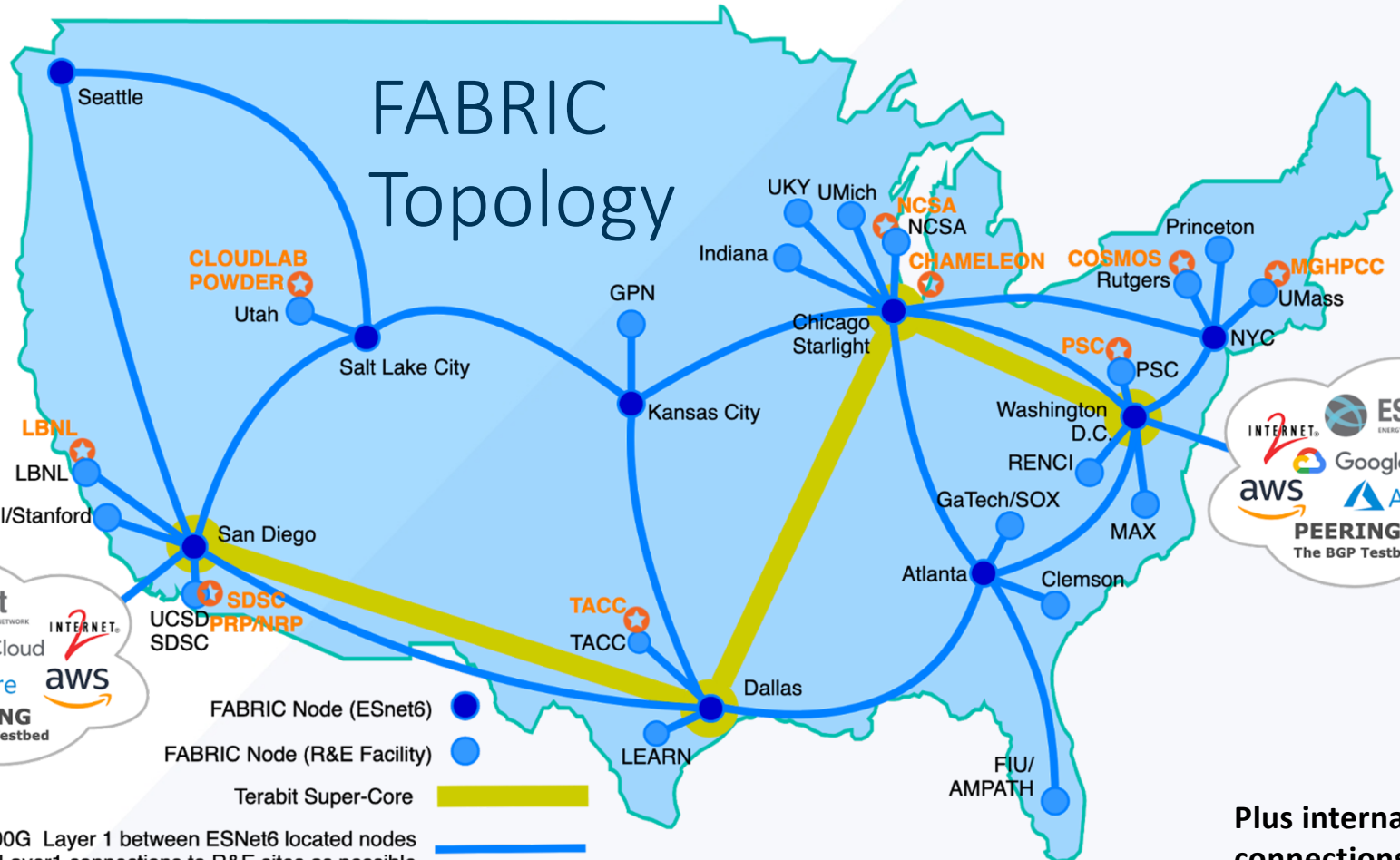
FABRIC
Topology

FABRIC Edge

UW EAGER: Internet measurement in FABRIC

- **EAGER project goal: develop capabilities that catalyze Internet measurement research in FABRIC**
  - **Build infrastructure**
  - **Focus attention of the Internet measurement community on FABRIC**
- **Internet measurement is <u>not</u> FABRIC infrastructure measurement**
  - **Coordinated with development of FABRIC MF (J. Griffioen - UK)**
- **Three components in our project**
  - **Active probe-based measurement via RIPE Atlas**
  - **Passive layer 1 measurement via OptiMon**
  - **Distributed network telescope - today's topic**

The FABRIC network telescope

- **Motivation**
  - **Network telescope data is useful in an expanding set of applications**
  - **Universities have unused v4 address space**
  - **Big, centralized telescopes are difficult to maintain for many reasons**
- **What does success look like?**
  - **Operational network telescope distributed across FABRIC infrastructure**
  - **Broad participation by FABRIC edge partners**
  - **Active use of data in research**
  - **Community support for software components**

Objectives for the project

- **Develop FABRIC telescope software package that encourages deployment**
  - **Easy to configure & manage**
  - **Easy to federate (share data)**
  - **No special HW requirements (utilize standard FABRIC HW)**
- **The FABRIC telescope should be easy for users (academic researchers)**
  - **Simple data structures**
  - **Simple UIs**
  - **Extensibility is key to supporting different use cases**
- **Non-specific goals**
  - **"Broad deployment" in FABRIC with a "reasonable" amount of address space at each node**
  - **Federation (data sharing) will be "encouraged"**
- **Non-goals**
  - **Scalability to support high data rates**
  - **Long term data storage**

Approach

- **Local sensor deployment model**
  - **vs. FABRIC-based backhaul**
  - **Full control of configuration**
- **Create a software version of Stardust environment**
  - **Libtrace, Corsaro3, InfluxDB, Telegraf**
- **Federate in the UI (Grafana) running at CAIDA**
  - **Scalability assessment required**
- **Document, document, document…**
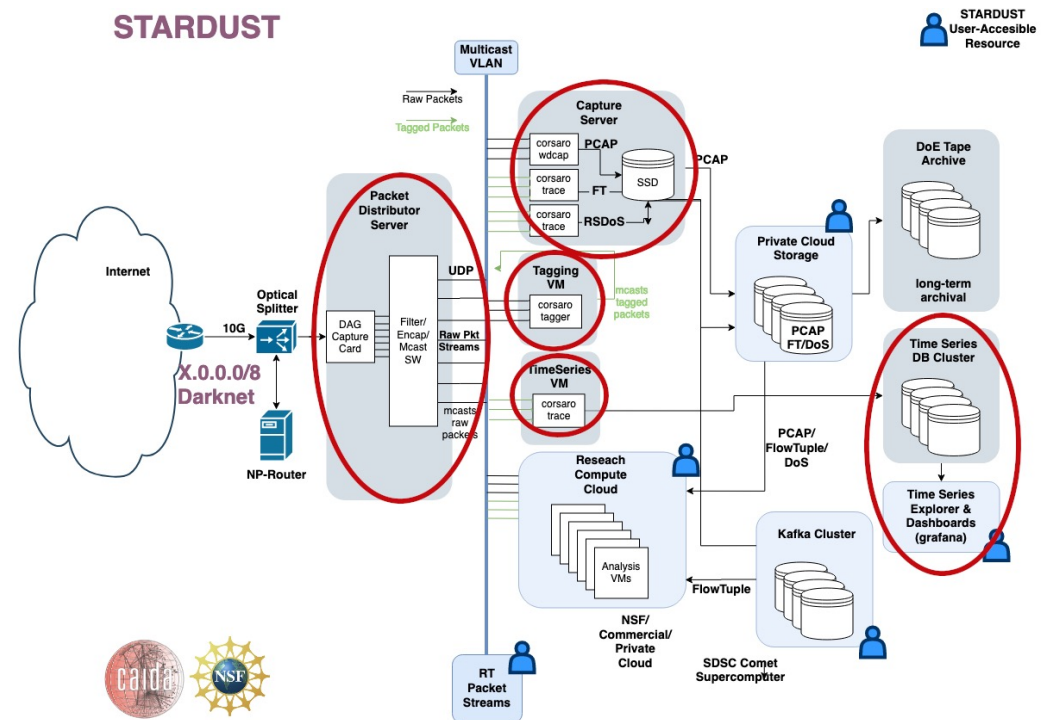
Status & timeline

- **Open questions regarding configurations**
- **We've begun development of "virtual Stardust" (Starlint? - we will fine a better name)**
  - **Traffic capture**
  - **Traffic tagging**
  - **Flow tuple generation**
- **We're working with the UW IT networking group on deployment**
  - **Dedicated server should arrive this week**
  - **/20 - /24 is the current monitoring target**
- **ToDo**
  - **Data management and storage – July '21**
  - **Federation with Grafana UI at CAIDA – July '21**
  - **Deployment in UW DMZ – Aug '21**
  - **Outreach for new deployments in FABRIC – Aug '21**
  - **First non-UW deployment – Oct '21**

Thank you!

- **Hunter Evans – UW-Madison**
- **Hakan Dingenc – UW-Madison**
- **Alberto Dianotti - CAIDA**
- **Shane Alcock - Alcock Network Intelligence / University of Waikato**