Measuring achievable throughput using a widely distributed automated platform

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CAIDA AIMS 2016

Introduction

- We are North America’s largest cable Internet provider with over 22 million customers in 40 states.
- Mostly DOCSIS network for residential and business customers.
- 100G backbone between national and regional datacenters and local head-ends.
- WiFi, FTTP and Metro-E customers.

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Community Project Sponsorship

RIPE ATLAS

NLNOG RING

(Coming Soon!)

New Projects? Contact us! -- **qoe_research@comcast.com**

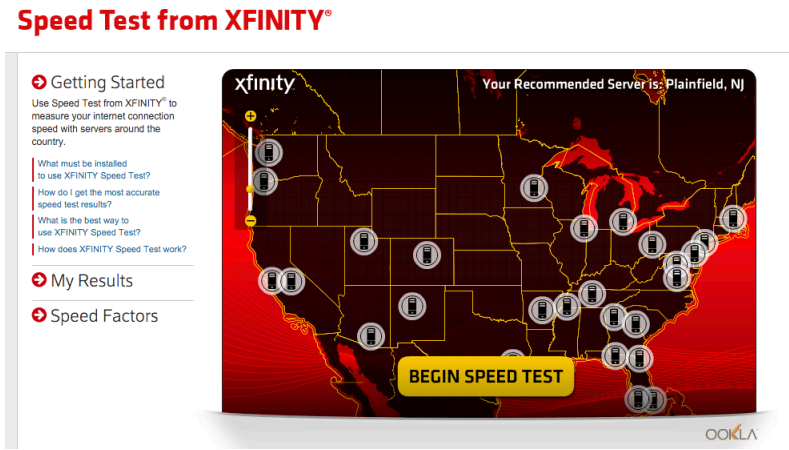
Current Bandwidth Measurement Projects

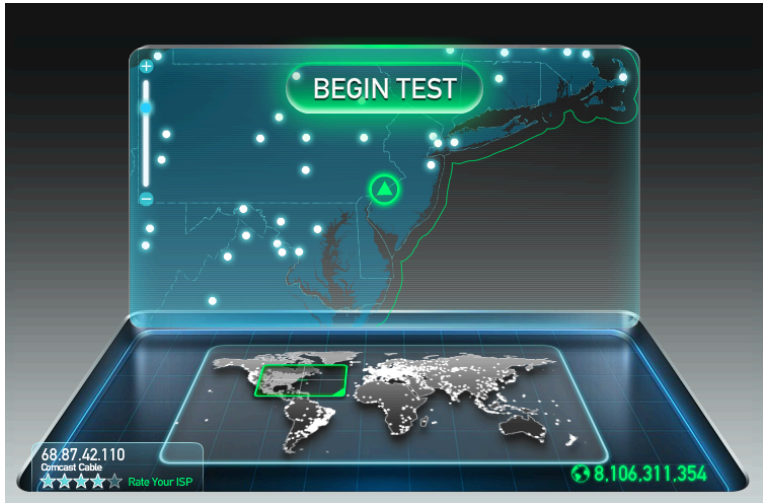
Customer Initiated

- Residential Speedtest (speedtest.comcast.net)
- Ookla Speedtest (speedtest.net)

Automated

- SamKnows
- Inter-datacenter latency and uptime monitoring





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Next Generation Automated Measurements

What We Need

- Automated throughput measurements to commission new customer speed tiers.
- Ongoing automated throughput testing for FCC regulatory purposes.
- On-demand diagnostic throughput measurements to troubleshoot cable plant issues.
- Latency, DNS and traceroute measurements from any customer's point of view.
- Inter-datacenter on-demand throughput, continuous latency and traceroute measurements.

Next Generation Automated Measurements

Platform Objectives

- Users should have the ability to schedule measurements on their own with minimal knowledge of the system.
- Datasets generated by measurements should be easy to access and available in several formats.
- Backend and probes must be Linux-based and portable to a variety of hardware.
- Must be scalable to a very large number of measurement nodes.
- Should follow the guidelines of the IETF LMAP working group.

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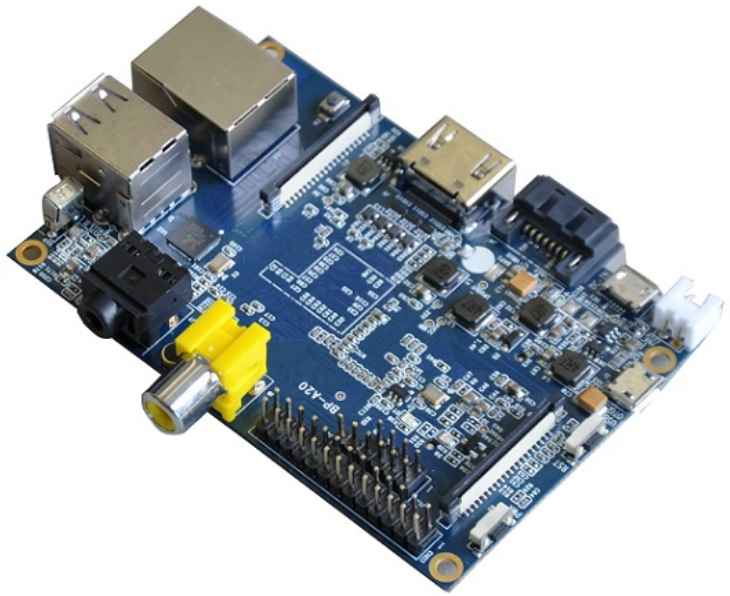
Project Polaris Hardware



BananaPi single board Linux system.

- ARM Cortex-A7 dual core processor.
- 1GB DDR3 RAM.
- 1GbE dedicated Ethernet.
- Maximum Ethernet throughput around 900 Mbps.
- Cost is ~$20 per board.

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Project Polaris Hardware

Embedded Linux Router / Cable Gateway

- Combination Cable gateway, router, WiFi AP, Voice eMTA.
- Runs Linux on an Intel architecture.
- Platform will be shared with other internal applications.
- Can also be used for internal measurements, such as WiFi and VoIP.

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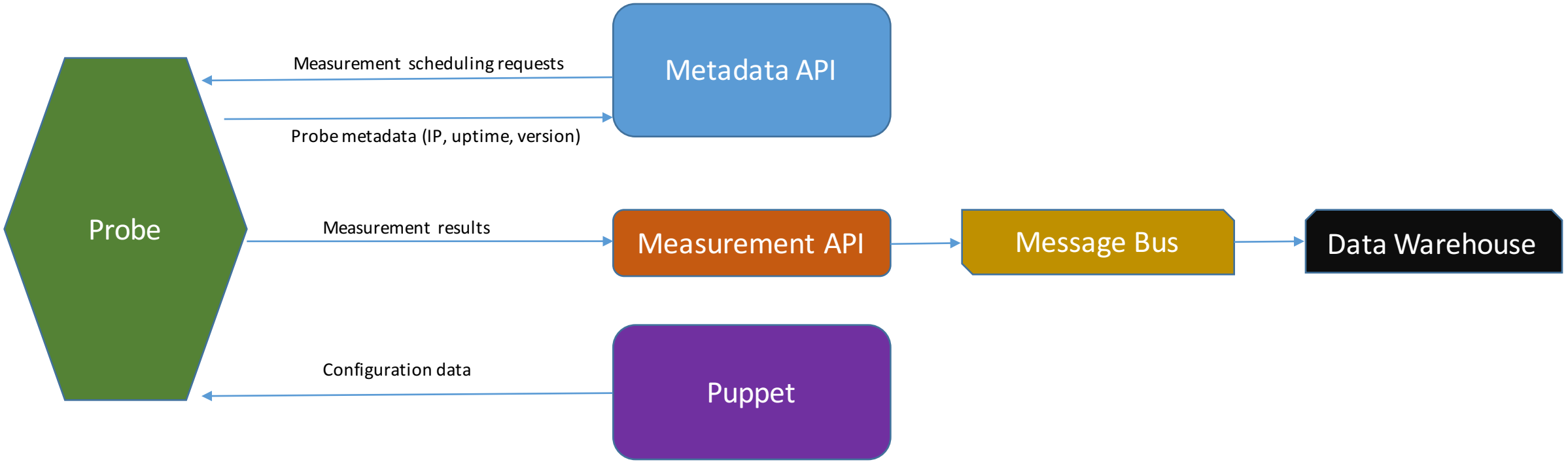
Project Polaris Platform Architecture



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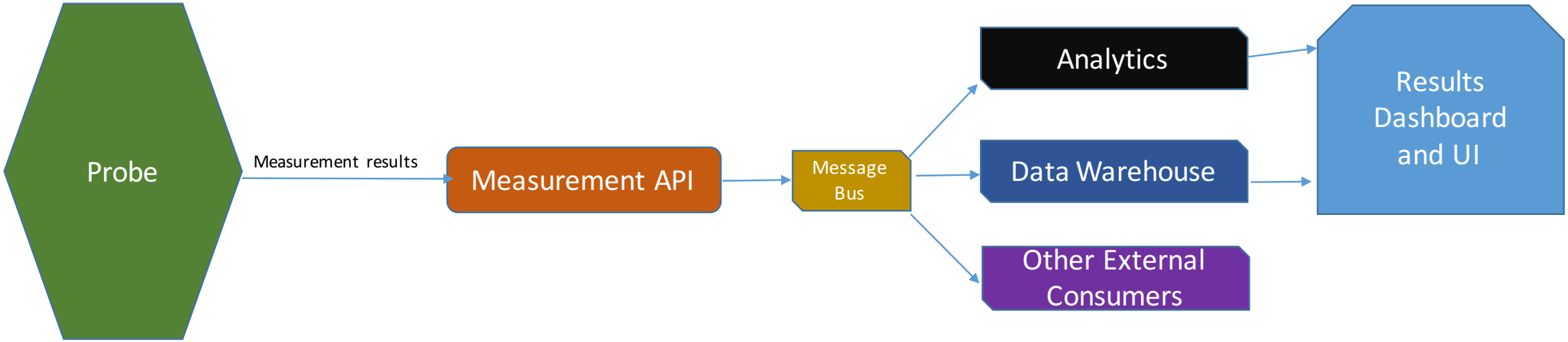
Project Polaris Data Collection Architecture



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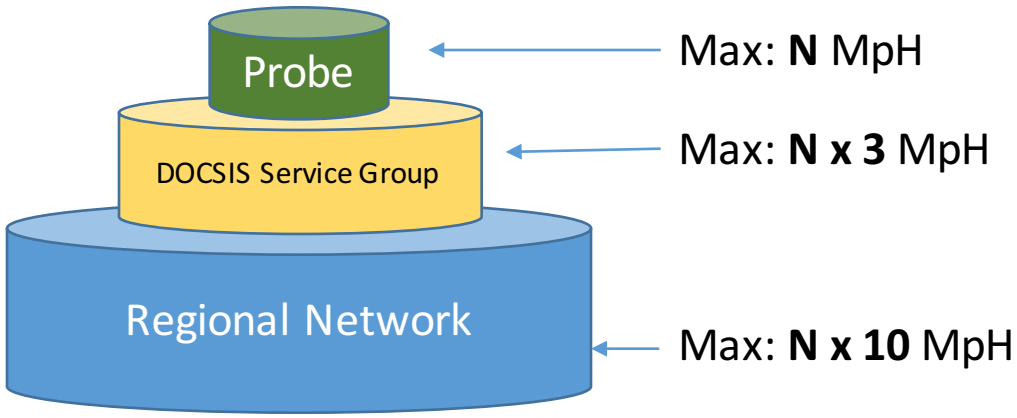
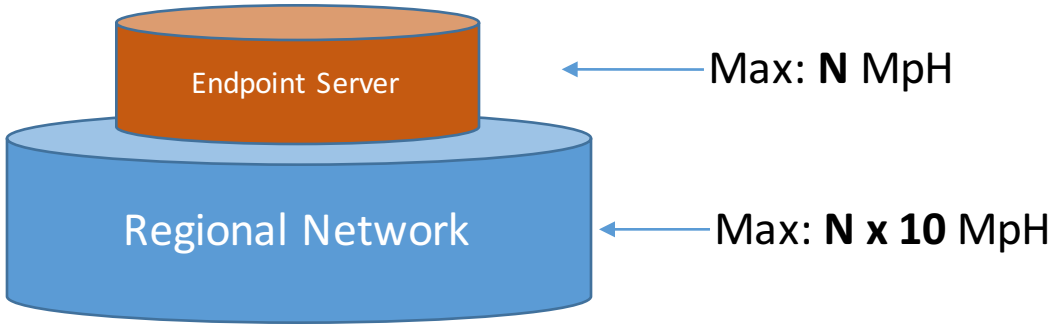
Throughput Measurement Scheduling

Probe Scheduling Hierarchy



Endpoint Server Scheduling Hierarchy



MpH = Measurements Per Hour

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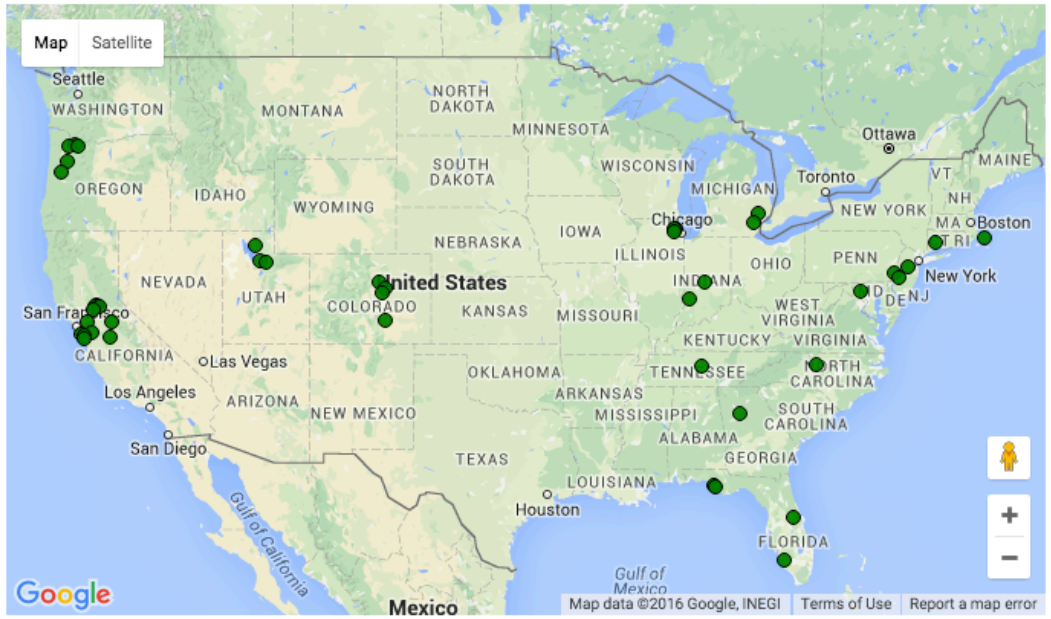
Locations (61)



Project Future

- Currently developing probe-level code.
- Concurrently building out collection back-end.
- Initial deployment of ~60 probes throughout footprint.
- Up Next: UI development and satellite build-out.
- Seeking feedback from within Comcast and the industry.

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Questions?

Feedback?