

perfSONAR for Community Access Broadband Initiatives

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Abstract

perfSONAR is the de facto network measurement toolkit for research & education networks. Quilt Corporation NFP is building a new network to serve economically disadvantaged neighborhoods throughout South and West Chicagoland via its Community Access Broadband Initiative (CABI). SCinet is a global collaboration of high-performance networking experts who provide a platform that connects SC conference series attendees and exhibitors to the world. This NRE seeks to deploy perfSONAR nodes within QUILT and SC25 SCinet infrastructure to evaluate methods smaller network operators in the community may use to better interact with research & education networks.

Beyond the technical demonstration, this effort will engage and train local residents in STEM workforce skills through hands-on server-building workshops, with skills designed to prepare participants for entry into registered apprenticeships or related career pathways. Economically, it aims to demonstrate how technical upskilling can increase household incomes, reduce unemployment, and build lasting economic resilience. The project establishes a replicable model for driving social equity, local ownership, and community empowerment while meeting rigorous SC25 research and performance testing objectives.

Goals

1. Build perfSONAR x86 servers and Raspberry Pi 4 hosts in one of Chicago's most economically disadvantaged neighborhoods during a series of workforce development-style workshops
2. Install these hosts at QUILT's cabinet in QTS's Datacenter located in Chicago's South Side
3. Utilize a perfSONAR node in Starlight's SC25 show floor cabinet to run tests against the perfSONAR nodes at QTS Chicago
4. Utilize a perfSONAR central management server to build a network testing mesh throughout multiple CABI sites (stretch goal)

QUILT CABI is currently in the process of building its network from QTS Chicago into its service areas using middle-mile fiber from Crosstown Fiber, with last-mile distribution provided by NODE Networks, a local ISP, ensuring that connectivity reaches community anchor sites and homes served by QUILT CABI. As a newer network operator, QUILT does not have a surplus of IPv4 addresses; currently a /28 of IPv4 addresses provided by QTS is being utilized. However, an abundance of IPv6

address space is available thanks to QTS providing a /48 allocation. We intend to maximize the use of IPv6 whenever possible, documenting lessons learned and operational challenges.

Impact

Chicagoland has a vibrant community of non-traditional talent committed to finding ways overlooked candidates may enter the cyberinfrastructure workforce. Building perfSONAR measurement infrastructure near the Quilt CABI on-net locations they will serve creates perfect opportunities to introduce cyberinfrastructure careers; we seek to better research and develop this process. Having these perfSONAR nodes and connectivity into SCinet for SC25 will help build a strong relationship with SCinet's volunteers for much larger projects once CABI's footprint expands in 2026.

Resources

We require 100G connectivity from QTS CHI1 into Starlight to interconnect the QUILT CABI core network cabinet to the SC25 connectivity at Starlight, to be provided by Crosstown Fiber. Multiple x86 servers and Raspberry Pi 4 hosts will be required; these will be sourced through QTS and other community donors.

Involved Parties

- Quilt Corporation NFP
- Crosstown Fiber
- QTS Datacenters
- Northwestern iCAIR