NYC Mesh

SUNY Cobleskill Site Survey

We will execute the project in three phases:

1. Points on campus
    a. Warner Hall
        i. to Water Tower
        ii. to Zion Church
        iii. Wheeler via existing wired campus network
    b. Wheeler
        i. to Farm and Ag Center
    c. Ski Lodge
        i. to Farm
    d. Farm
        i. to Wheeler and Ski Lodge
2. Redundant mesh on campus
    a. Agricultural Center *
    b. Library
        i. TBD
    c. Water Tower
        i. to Ski Lodge via Ethernet, either buried or aerial
        ii. to Warner
3. Off-campus
    a. Coby's restaurant *
        i. Will use existing Ethernet to connect roof to ground level
    b. Non-SUNY locations - will require negotiation with all parties
        i. Zion Lutheran church *
        ii. Cobleskill-Richmondville High School *

* Will need additional site survey at a later time

The actual sequence of installs will depend on building access, completion of prep work by SUNY staff and delivery of equipment.

Six locations were reviewed for potential installs- Warner Hall, Library, Farm, Wheeler, Ski Lodge and Lodge Water Tower. All except the library were found to have line-of-sight connections to other locations. The Agricultural Center (Ag Center) although not part of the survey will also be included eventually in installs.

The Zion Evangelical Lutheran Church was discussed as a great off-campus location as it has line-of-sight (LOS) to the campus and most of the town.

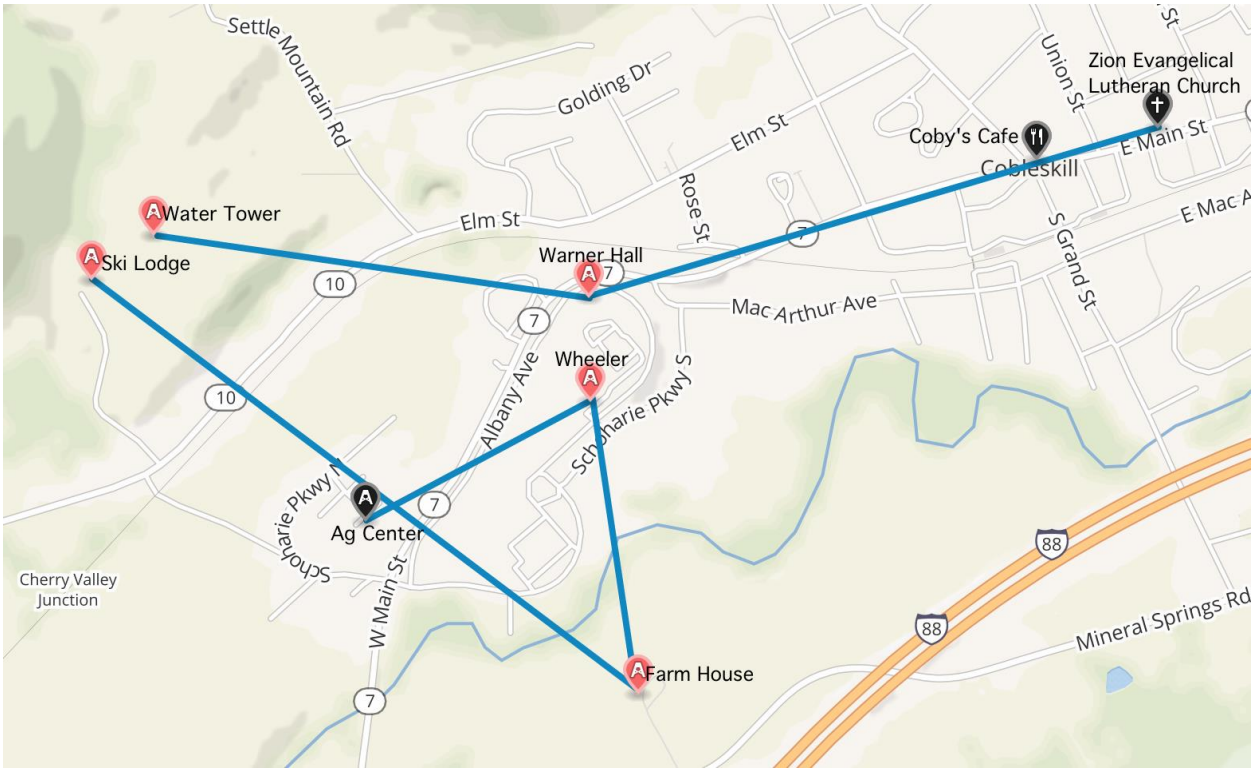
The initial install will consist of Ubiquiti NanoStation NSM5s. These are chosen for mesh compatibility, cost and reliability. They will be flashed with NYC Mesh firmware to enable multi-point to multi-point configuration.

Ideally antenna poles should be 1 ½" diameter, though anything from 1" to 2" is fine. The routers come with strong UV-resistant plastic ties. All cable and cable ties should be outdoor, UV-resistant.

There are 8 NanoStations planned in the survey and further will be required for the Ag Center and possibly the restaurant in town and the church. The church may get routers directly from NYC Mesh depending on legal requirements. It is recommended to get 12 NanoStation NSM5s to give us the flexibility to add a few more during the installs, and have some for testing.

NSM5s use power over ethernet (POE). Using "pass through" two routers can be powered by one power adapter. This means only a single run of ethernet cable from the adapter in the building is required to power two NSM5s. All planned installs are one or two routers. The Farm and the Ski Lodge will also need an omni-directional 2.4Ghz radio and antenna. This will

provide access points for the surrounding area.



Locations for phase 1 install shown in red. Blue lines represent line-of-sight connections.

Warner Hall

Existing antenna will be used for two NSM5s-

1) NSM5 to Water Tower

2) NSM5 to Zion Church

Warner Hall roof with existing antenna on left, Water Tower in distance on the right.

Ethernet cable should be run following exiting coax path through the window. The ethernet cable needs to run from the very top of the antenna to an existing router in the building (most likely on the ground floor).

Library

The library has views of other buildings within the main campus but poor views to sites off-campus. It was decided not to install here. We may possibly install in the future if we want cross-campus redundancy.

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Wheeler

Wheeler has very good LOS to the Farm and also the Ag Center. An install point was marked on the corner of the railing. Ideally the antenna pole should be 1 ½" diameter and extend 2' above the railing. It cannot block the telescope. We can work with a 1' pole extension if necessary.

Ethernet cable must be run from 2' above the marked corner to a router on the existing network of the building.

3) NSM5 to Farm
4) NSM5 to Ag. Center

Wheeler installation point marked "MESH ↑→ "

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Ski Lodge

The Ski Lodge has LOS to the Farmhouse. It has an existing antenna pole on the roof that could be used. This would provide internet connection via a single hop to Wheeler and a direct connection for collaboration between projects in both the Ski Lodge and the Farm.

Ethernet needs to be run from the top of the existing antenna into the Lodge near a power outlet.

5) NSM5 to Farmhouse
6) Omni 2.4 GHz

Ski Lodge showing existing antenna pole on left and the Farmhouse in the distance

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Ski Lodge Water Tower

The Water Tower view to the campus is obscured by a line of trees. There will be some attenuation of signal, but experience says it would still work. There is clear LOS to the church. The antenna could be connected to the Ski Lodge by ethernet either buried or aerial. We should check that this distance is less than the ethernet limit of 300'. Power is available at the tower, so the POE adapter should be installed there.

There is an existing antenna pole next to the tower that could be used. It has an unused Yagi pointed at Warner Hall. Alternatively it would be possible to install on the ladder on the side of the tower for greater height. This would require a custom made bracket and an extension to get LOS to the church.

Existing antenna at the Water Tower

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The Farmhouse

The Farmhouse is being restored and the roof of this would be the best place for an antenna. The other building at the farm were found unsuitable. A quick install could be done at the top window. One router would be able to mesh with both Wheeler and Ski Lodge. The NSM5 routers have a 45’ beam width which covers both locations.

7) NSM5 to Wheeler and Ski Lodge
8) Omni 2.4Ghz

Farmhouse top window looking towards Ski Lodge and Wheeler

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