

# Grant County Wireless Connectivity Project

Education Enterprise Steering Committee /  
Oregon Department of Education LastMile  
Connectivity Grant

Submitted by:

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**Introduction:** Grant County Education Service District has provided technology support for the schools within Grant County for over 17 years. As the schools press forward into the 21<sup>st</sup> century, Grant ESD continues to provide cutting-edge services that are both economical and effective.

In 1996, Grant County ESD purchased the first T1 line outside of Grant County. This provided high-speed access to the Internet for the schools served by Grant ESD. The ESD investigated cost effective ways to accomplish a solid infrastructure. To effectively provide Internet access for the schools, the ESD decided to become an Internet Service Provider (ISP). This ISP took the form of JuniperNet Network. The services provided by Grant ESD included Domain Name Service (DNS), Dynamic Host Configuration Protocol services (DHCP), Windows Internet Name Services (WINS), proxy services, electronic mail services, firewall services, Internet filtering services, and web hosting.

As the infrastructure fell into place, the next step became connectivity for the schools. Because of the high monthly cost of individual T1 connections to each school, alternate methods of data transmission were explored. Microwave bridges utilizing the 5.8 Ghz range were placed in strategic locations around the county. These bridges provide 54 megabits per second transmission rates. Since January 2001, all public schools within Grant County have used the ESD for Internet Access. Each school is wired with Category 5e or higher copper wire that connects student and teacher workstations to servers. Each building also utilizes fiber backbones running at a full Gigabit for full duplex transmission.

As the network has matured throughout Grant County, the ESD has recognized a need to monitor the traffic and devices. Currently, a multi-router traffic graphics program is used to monitor the amount of traffic traveling through the ESD to the Internet. A second monitoring program, What's Up Gold software, has been set up to monitor critical devices on the network. It allows the ESD technology staff to know when and where a problem occurs. Many times the staff recognizes and responds to problems before the end user is even aware of any abnormalities. With these two strategies in place, the ESD can effectively monitor traffic, bandwidth consumption by districts, devices down or not responding, and uptime on all network-critical devices.

Grant Education Service District has overcome many of the challenges facing frontier education. The students have benefited from the ability of Grant ESD to provide state-of-the-art technology in all five districts. The distances and challenges involved in creating high-speed last mile connectivity have been solved to each of the districts through the use of wireless technology. The solution was an economic decision to provide 54 megabit connectivity to each and every school building and then to aggregate the buying power of all districts at the point at which the districts connect to the Internet. That point is the ESD and it currently spends \$4,783.32 *per month* for

three T1 lines (4.5 megabits). Grant ESD has the opportunity to purchase a 10 meg pipe from the Oregon Health Network/Department of Justice build-out that is occurring statewide. The cost of the 10 Mbps will be much lower per month than the cost of the 4.5 Mbps that we currently purchase from Verizon/UUNet, but the ESD must add the single wireless connection to access the Internet via Frontier TeleNet.

**Project Description:** The project will seek to establish last-mile connectivity between the five school districts within Grant County, Grant County ESD, and Frontier TeleNet. Frontier TeleNet is an ORS 190 Entity formed in 2000 by Intergovernmental Agreement between Gilliam, Sherman and Wheeler counties and the North Central Education Service District. It was formed to facilitate the construction and operation of a public purpose wide area telecommunications network serving law enforcement, emergency services, public health, education, and local government across the 4000 square miles of the three underlying parties to the IGA and the service area of the North Central ESD. The service area has since expanded and takes in approximately 23,000 square miles. Frontier TeleNet is building access to Grant County with a system that provides 100 Mb of throughput with 10 Mb dedicated to the schools, but we must reach Frontier TeleNet to take advantage of the cost savings and expanded service. The biggest obstacle that the schools and ESD face within Grant County is not the last mile of connectivity – we have solved that situation for the schools through the use of point-to-point bridges. The greatest obstacle is financial (the cost of a single T1). By accessing the connection through Frontier TeleNet, the cost will be much lower for 10 Mb than it is for 4.5 Mb.

To access a dedicated 10 Mb pipe, Grant ESD will install a 25' Rohn 45 Tower at the ESD to support one Motorola Canopy Wireless PTP 400 Series Ethernet bridge. This will provide a 60 Mbps backhaul from the ESD building to Eagle Peak, which is the terminus of the Frontier TeleNet network. The total length of this hop is three miles. This strategy provides a cost-effective alternative to dedicated fiber and the extremely high prices charged by providers in this area. With an estimated MTBF (mean time between failures) of 57 years, the Motorola product is a carrier-class radio that will provide many years of service to the schools.

This direct connection to a dedicated 10 Mb pipe will benefit all five school districts within Grant County. The access will directly affect every public school student and employee by increasing bandwidth and connectivity, while decreasing costs associated with Internet access.

This project will complete a partnership between several agencies to directly connect Grant County ESD and its component districts with the Internet. Agencies involved include the Oregon Department of Justice, Grant County, the Oregon Health Network, Frontier TeleNet, North Central ESD, and Grant County ESD with its component

districts. This is an infrastructure project to complete the connection between the ESD and the Internet at an acceptable rate and cost.

Over the past 13 years, the school districts within Grant County have made the commitment to provide one of the most innovative networks in the state of Oregon for students and staff. Many resources helped to build the infrastructure used by the districts today – district budgets, county funds, donated equipment from corporations, SB 622 School Technology Fund monies, countless hours of donated manpower and E-rate discounts. Unfortunately, many of the sources of funding have decreased as the need has increased. This wireless project allows the schools to leverage the existing innovative infrastructure against the cost savings and budget realities that exist for the future. The existing infrastructure has been implemented at a cost of well over \$500,000.00 and years of hard work. The total number of staff and students affected by this project will be upwards of 1280 people.

**Criteria:** This project builds upon the existing wireless infrastructure and provides last-mile connectivity at the 10 Mb level.

**ESD and/or School Staff Involved:** This proposal involves players from each of the schools within Grant County because of the impact caused by this project. Grant ESD will become the lead participant in this process and provide technology support for the project. Historically, each school district has shown a very substantial commitment to technology, both in manpower and money. As school populations have declined, however, each district has relied on Grant ESD for a greater share of its technology resources. The main contact for this proposal will be Robert Waltenburg, Director of Technology for Grant ESD (541)575-4076.

**Equipment:**

- Point-to-point bridges – Motorola Canopy PTP 400 Series

Canopy Part Number	5430BH
Description	60 Mbps 5.4 GHz BH Pair - Integrated
Signaling Rate	60 Mbps
Typical LOS Range	non-LoS Up to 6 Miles (10Km),near-LoS up to 25 Miles (40Km),LoS Up to 124 Miles (200Km)
Typical Aggregate Useful Throughput	Dynamically variable modulation ranges from 1.5 Mbps to 21 Mbps. (Upgradeable to 60 Mbps via Software License Key)
Frequency range of band	5.470 GHz–5.725 GHz
Mean Time Between Failure (MTBF)	57 yrs
Wind Survival	242 km/hr (150 miles/hr)
Interface	10BASE-T / 100BASE-T (RJ-45) – auto MDI/MDIX switching

- Tower to support infrastructure – 25’ Rohn 45G Tower

Rohn SB45G	Short base section
Rohn 45AG3	9' Top Section with 2 ¼" OD tubing
Rohn 45G	10' tower section
EF2545	Erection Fixture 2 ½" sheave
WP45G	Work Platform

**Installation:** As a General Electrical Contractor licensed with the State of Oregon (CCB #159178), Grant ESD will be installing all equipment. Grant ESD will hire a contractor to dig the four foot base hole, but all installation, construction, and microwave setup will be performed in-house.

## Budget Information

*Project Title:* Grant County Wireless Connectivity Project – a project to increase last-mile bandwidth and reduce ongoing costs to all schools within Grant County

*Project Start Date:* April 2009

*Direct Costs:*

- The direct costs incurred for the project will be the purchase of two radios, one 25' tower, concrete, and the hiring of a contractor to dig the four foot hole for the base of the tower.
- Grant ESD will provide all installation of the equipment, construction of the tower, wiring, and programming of the radios.
- The only indirect costs associated with the project will be those absorbed by Grant ESD during installation and startup.

*Funding Sources:*

- Equipment and tower purchases for this project will be funded through the ODE Strategic Network Connectivity Grant.
- Costs associated with installation and programming of the equipment will be absorbed by Grant ESD.

*Sustainability:*

- With many years of experience in the design and manufacture of wireless LANs and Point-to-Point equipment, Motorola understands that enterprises require the same uptime and reliability in a wireless network as in a wired network. The equipment has an MTBF (mean time between failures) of 57 years.
- Because the equipment has such a long life expectancy, minimal maintenance is anticipated for these radios. All required maintenance will be performed by qualified personnel from Grant ESD.
- As history has shown, the school districts within Grant County are committed to providing technology necessary for students and staff to successfully compete in an ever-changing world. The increased opportunities provided by this project are part of this strategy.

*Costs:*

2	Motorola PTP 54400 Full Int. Link (Canopy Radios)	\$9,000.00	\$18,000.00
1	Motorola LPU End Kit PTP 400/600	\$450.00	\$450.00
2	Rohn 45G 10' sections	\$216.55	\$433.10
1	Rohn 45AG3 9' Top Section	\$285.52	\$285.52
1	Rohn SB45G 5' Short Base Section	\$166.40	\$166.40
1	Rohn EF2545	\$1,424.80	\$1,424.80
1	Rohn WP45G Work Platform	\$232.70	\$232.70
1.5	Concrete	\$110.00	\$165.00
2	Backhoe	\$85.00	\$170.00
		shipping	\$495.00
		<b>total</b>	<b>\$21,822.52</b>