

## Wireless rules for Oregon courts

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**High-speed connection links network and data facilities, supporting offices statewide.**



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Officials at the Oregon Judicial Department (OJD) ran into a problem several years ago when they began looking for a new home for the department's information technology staff and equipment.

Managers had to figure out how to connect the network operations center (NOC) with the state's data center and support more than 2,000 department employees at 70 locations statewide without requiring IT staff members to spend all their time on the road.

"We needed to do two things," OJD Chief Information Officer Bud Borja said. "We wanted to move our equipment into a real data center, and our office building was being relocated at the same time."

Ideally, the two would go to the same place, but — as so often happens in the real world — that is not the way it worked out.

"We are downtown, so we had the constraint of physical space in downtown Salem being at a premium," Borja said, referring to the state's capital. "The cost of building a data center was not something we wanted to take on."

The data center moved to a facility that is shared with other state agencies and also contains the state's disaster center, to which the governor relocates in times of emergency. But the IT staff's new home left them somewhat cut off. "The building we ended up choosing for our staff was not on any current path of fiber that we could tap in to," Borja said.

The solution was a high-speed wireless bridge that enabled IT managers to establish virtual fiber-optic connections between locations.

The IT department chose a wireless Gigabit Ethernet link to connect the network operations center with the state Supreme Court building, which sits on the state's fiber-optic backbone. They selected the AdaptRate60 bridge from BridgeWave Communications.

Since its installation early last year, the wireless network has provided uninterrupted communications with virtually no latency via a pipe big enough to let the IT staff restore a remote desktop in five minutes.

"I think of this pretty much as a fiber connection," said Ollie Brown, infrastructure manager.

"We have had foggy days, which were a concern, and it hummed right through it."

It also operated at its full data rate through torrential rains, said Brian Canfield, the department's telecommunications

administrator.

“I have not seen the link drop.”

The AR60 is a very-high-frequency point-to-point system that operates in the 60 GHz band, which is well-suited to high-speed connections, said Gregg Levin, BridgeWave’s chief marketing officer.

“The spectrum allocations are enormous compared to the lower frequencies,” Levin said.

A full 7 GHz of bandwidth is set aside for unlicensed use in that band. “There is a lot of real estate available, and it lets us do very highcapacity links.”

The system is full duplex, with a 1.4 GHz channel in each direction for the link. It uses a one-foot antenna with a Gigabit Ethernet fiber link in and out at each end. An advantage of the 60 GHz band is that the beams are focused and narrow, at only 1.4 degrees, so the spectrum can easily be shared by adjusting antenna direction and using different frequency channels, allowing not only high-speed links but also lots of users within a given area. The 60 GHz energy is absorbed by oxygen, which can limit the system’s range. But that also can be an advantage: The signal absorption, coupled with the narrow beam width, reduces interference with other radio signals.

“That is why the Federal Communications Commission made it license-free,” Levin said.

He said the system complements fiber-optic cabling rather than competing with it, providing a cost-effective way to extend current fiberoptic infrastructure when new a installation is too expensive. “After the bubble burst” in the late 1990s, he said, “there isn’t a lot of fiber access going in.”

At about \$110 per foot for new fiber-optic installation, anything more than 1,000 feet starts becoming cost prohibitive. Because of the cost and recurring service fees for fiber-optic connections, many customers see a full return on an investment of a little more than \$20,000 for a wireless link in four to eight months, Levin said.

“Originally, we considered trenching the fiber ourselves,” Canfield said.

But the estimated \$250,000 cost put that option on the back burner, Borja said. “Our backup plan was that we could do that” if a better option did not appear.

### **Multihopping over fiber**

Other options included microwave, but that would not be dependable in the drizzle and fog of the Pacific Northwest. The 60 GHz solution looked promising, but the half-mile line-of-sight effective range was a limitation.

A link from the NOC to the data center was out of the question, but reaching the Supreme Court building was a possibility. A study with a link analysis tool showed that a connection with 99.999 percent reliability could be established with double hop.

“Sometimes, to get from point A to point B, you have to go through point A.1,” Borja said.

The NOC link jumps to the state’s Public Services building a block away, and from there it jumps again to the fiber-optic hub in the Supreme Court building.

The latency for the wireless link is equivalent to that of a switch on an Ethernet network. The round-trip latency between the NOC and the data center is less than one millisecond, Canfield said.

The frequent but light rains typical of the Northwest should not be a problem for the 60 GHz system, but just in case, the AdaptRate can automatically drop its data rate from 1 gigabit/sec to 100 megabits/sec when performance of the link begins to degrade.

This provides a smaller but still sufficient pipe to maintain the connection, though with reduced response time. So far, this feature has not been needed despite several days of heavy rain coupled with heavy use.

One of the applications getting heavy use via the link is videoconferencing, as the OJD makes plans for the creation of electronic courts, in which everything is available online.

Project planning requires meetings, and it is not easy for judges from around the state to travel to Salem for the sessions.

“It is not uncommon to have a meeting with 10 people remotely conferencing in,” Borja said. “And it’s not uncommon to have multiple video meetings going on at the same time along with our data management, and it all goes off with no problem.”

As courts begin to go electronic, OJD will face the challenge of linking historic courthouses to the state backbone without making physical changes to the building, and the NOC experience with wireless links is expected to come in handy.

“We don’t rush into technology,” Brown said.

“We are not cutting edge. We like to try things out first.”

