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Case Study

RUGGEDCOM network infrastructure solutions enable Clark County, WA to green light its Intelligent Transportation System modernization.

Western Systems
Innovative Transportation Solutions

Clark County Case Study At-A-Glance:

Customer: Clark County monitors and manages an intelligent transportation system (ITS) across 656 square miles of city, suburbs and rural areas for more than 425,000 citizens in southwest Washington state.

Challenge: Clark County's need to modernize and prolong the life of their infrastructure investments led them to seek a "rock solid" communication network as the foundation for its Intelligent Transportation System.

Solution: Siemens RUGGEDCOM's comprehensive product offering coupled with Western Systems integration expertise enabled several Clark County strategic initiatives including fiber implementation, legacy device connection, network segmentation, and network management.

Results: Clark County's RUGGEDCOM communication network reliably delivers data that enhances traffic monitoring and management capabilities for supervisors and will serve as the foundation for future functionality.

Clark County, Washington, is named for William Clark of the Lewis & Clark expedition. It is the state's fifth most populous county with more than 425,000 residents living in the city of Vancouver, surrounding suburbs and rural areas to the north and east. The county is bounded on the south and west by the Columbia River and many residents commute daily to Portland, Oregon, on the south bank of the Columbia.

Though much of the county is a low-lying floodplain, its northern and eastern areas rise to 4,000 feet elevation in the foothills of the Cascade Mountains, which include Mount Saint Helens, Mount Hood and Mount Adams, all visible from the county. Winter winds can bring freezing rain that coats roads with glaze ice, and destructive summer winds carry dust that can wreak havoc with outdoor equipment.

The county's rugged natural setting and magnificent resources have attracted settlers since the mid-19th century. In fact, Clark County has seen double digit population growth in every decade since its founding in 1845, with a 45 percent jump between 1990 and 2000 and a 23 percent jump between 2000 and 2010. Such consistent growth has made building an intelligent transportation system (ITS) a major priority.

Challenge: Clark County's need to modernize and prolong the life of their infrastructure investments led them to seek a "rock solid" communication network as the foundation for its Intelligent Transportation System.

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Nearly a decade ago, Clark County officials and staff realized they needed a future-oriented approach to an ITS that would prolong the life of their transportation infrastructure investments. Roads, bridges, and effective traffic management go hand-in-hand and serve as a pillar of the local economy and citizens' quality of life.

"Clark County had an ancient system that did not have communications to most of its traffic signals," said Rob Klug, traffic signals manager, Clark County Public Works. "We looked at our needs and tried to anticipate where intelligent transportation systems were going. One thing became clear: we needed a rock-solid communications network to be able to generate, retrieve and use traffic management data – even if we didn't yet know what that data was going to be."

Due to its sprawling geography, funding constraints and ambitious goals, Clark County realized that it would have to upgrade one traffic corridor at a time over multiple years to extend a new communication network to all its traffic signals. Because of its need for an array of rugged devices, a management software solution, and future product and service support, the county sought a solution provider with an established track record and market longevity.

"Our IT department had been working with the city of Vancouver, which was using RUGGEDCOM switches, and they were impressed," Klug said. "We did more looking. The Washington state Department of Transportation agreed with the city on RUGGEDCOM's quality. So we decided to go down that path, based on RUGGEDCOM's product suite, its capabilities and support, and other users around us. It has turned out to be a fantastic choice, because we've been able to do a lot of things with our system [that weren't possible before]."


Solution: Siemens RUGGEDCOM's comprehensive product offering coupled with Western Systems integration expertise enabled several Clark County strategic initiatives including fiber implementation, legacy device connection, network segmentation, and network management.

Beginning in 2008, Clark County started to modernize its traffic management system. Over the ensuing years, Clark County has capitalized on the extensive versatility afforded by the Siemens RUGGEDCOM portfolio for various steps in its ITS program. Those steps include activities such as:

• transitioning from a copper to a fiber optic network using RUGGEDCOM's RS 900G and RSG2200 Layer 2 switches,

• preserving and connecting legacy devices through deployment of RUGGEDCOM RS930L EoVDSL (Ethernet over Very-high-bit-rate Digital Subscriber Line) switches,

• segmenting its network for manageability using RUGGEDCOM's RX1500 routing platform,

• implementing new technology such as PTZ (pan-tilt-zoom) video cameras via RUGGEDCOM's RP100 Power-over-Ethernet (PoE) devices and

• leveraging the full functionality of the RUGGEDCOM Network Management Software (NMS).

"There are a lot of tools in the suite of products offered by RUGGEDCOM that we've been able to use and they've been helpful to our particular needs," said Klug.

One example of this is how RUGGEDCOM's Network Management Software (NMS) provides visibility into operational metrics and provides trouble-shooting capabilities, which can aid Clark County in pinpointing, diagnosing and fixing problems.
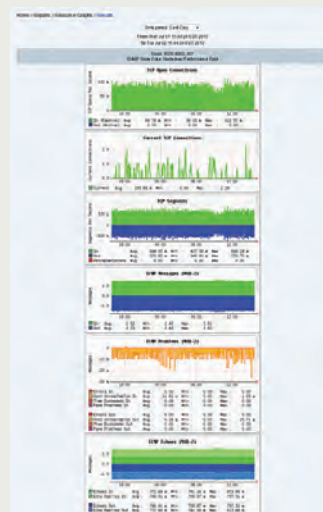
"The real benefit of the RUGGEDCOM NMS is that we can monitor our bandwidth between switches and routers and see what the throughput is to determine, for instance, whether we need to move from copper to fiber, because we've got overhead we can't get beyond," Klug said. "We're looking at continuous improvements in these systems for even greater efficiencies, and we need to know with confidence that we're making beneficial changes. The communications infrastructure is incredibly important for doing that."

"The single biggest customer benefit of the NMS is manageability," said Zach Hoiting, Washington state territory manager for Western Systems, which assisted Clark County with system integration. "But the NMS is also key for [data] security."

Another example of RUGGEDCOM devices meeting an application specific need is the ruggedness and durability required of field solutions by Clark County's periodic extreme climate and weather demands. All RUGGEDCOM devices have an operating temperature range of -40 to 185 degrees Fahrenheit (-40 to +85 Celsius) and are Class 1 Division 2 hazardous location compliant, allowing them to be placed in almost any location.

"We have humidity, vibration, dust – all of the environmental conditions that are bad for electronics in the field," said Klug. "Our goal was to have a rock-solid communication network and, with our RUGGEDCOM switches, so far we've had very few problems."

This level of dependability has allowed Clark County to easily scale its network design when capacity dictated, as illustrated by a recent implementation of RUGGEDCOM RX1500 routers.

"When we had deployed a critical mass of devices in enough corridors, our IT department expressed concern about the data communication chain between so many switches and our single router," said Richard Gamble, ITS Manager for Clark County.

"IT suggested a routed network, so last year we deployed five additional RX1500 routers, which divided our field devices into four geographically located management nodes. By putting routers out in the field, we have compartmentalized any data traffic issues to just one section of the network."

Results: Clark County's RUGGEDCOM communication network reliably delivers data that enhances traffic monitoring and management capabilities for supervisors and will serve as the foundation for future functionality.

Today, the RUGGEDCOM communication network that creates the foundation for Clark County's ITS has already improved the county's ability to manage traffic and service its citizens.

"We now have a centralized communication network that allows us to talk to every one of our corridors" Klug said. "We're able to select a traffic light timing plan based upon actual traffic in a specific corridor, as opposed to what a traffic engineer thought should happen when he or she programmed it two years ago. "

"Our central system, every five minutes, looks at over 800 `incident triggers'," Klug noted. "Not only will the system send us an email saying that `Fifth and Main has unusual congestion in the northbound left turn,' it will also provide a feed from the PTZ camera, using Power over Ethernet, at that location to remotely see what's going on and do something about it if a request or complaint comes in. "We couldn't do that if we didn't have a rock-solid communication system."

"We're very responsive to our citizens," Gamble added. "When a citizen calls in with a complaint and we can dial up a PTZ camera and see what they're talking about, they get excited. 'Wow, you can see what I'm talking about?' Later, they call back and say, 'You fixed it. Thank you!'"

In order to further refine the county's ITS, Klug and Gamble will rely on data being recorded and transported to its traffic control center via its RUGGEDCOM-based communication network.

"We'll not only have the data this year to quantify performance metrics, but the system will tell us where we need to focus for further improvements," Klug pointed out. "Our ability to determine whether we need to re-time a signal is based on our ability to 'talk' to that intersection over our communication system."

Looking ahead, the RUGGEDCOM communication network is also producing data that will enable future functionalities.

For instance, the county's ITS is generating signal phasing and timing (SPAT) data in an both XML and JSON data formats that third parties can use to develop apps for mobile phones or Internet-connected vehicles to optimize travel, as transportation infrastructure communicates with drivers and vehicles and vice versa. "We were given an opportunity, by management and elected officials here, to build a new ITS system, which polls every intersection every second and tells us critical information that can help us better manage the system," Klug said. "Do we have a signal in flash mode?

Do we have congestion where we typically don't have congestion? The goal is to do the best we can to manage traffic to allow the investment in infrastructure to last as long as possible before we have to build more roads."

And though Clark County has been busy installing its communication network and its ITS, it will soon turn to local universities for help in analyzing the resulting traffic data, including pedestrian movements, for performance and safety insights and forecasts, according to Klug.

Meanwhile, one recent event illustrates the intuitive benefits of the county's recent, RUGGEDCOM-based communication network.

"We have an intersection we call 'Sigzilla' – the biggest intersection in the county," Klug said. "It has dual left turns in all directions, at least two thru lanes in each direction, at least one right turn lane in all directions, and bike lanes on all approaches. Sigzilla also sits in the middle of a 1,200 foot stretch of arterial with five freeway interchanges. One interchange provides only 200-ft of queueing space from Sigzilla. It's in the most complex corridor in the county. If it goes into red flash, it's a big deal."

"Last year it went into flash," Klug continued. "Three seconds later the system over our RUGGEDCOM switches gave me signals in flash. In two minutes we drilled into the malfunction management unit and determined why it went into flash, called the signal technician, and told him what [tools and parts] he needed to take to the intersection. Within 14 minutes we had the signal running again, before the calls came in complaining about it."

It's clear to Klug that the RUGGEDCOM-based communication network provides the foundation of an effective, efficient ITS.

"A rock-solid communications network is critical to that ability to monitor and manage the traffic system," Klug concluded. "A lot of agencies [from other states] are looking at what we're doing and asking, 'How do we get there'?"