



# Colorado Department of Education

## Partnering with OneNeck to upgrade its network

### The Company

The Colorado Department of Education (CDE) is responsible for Colorado's 178 school districts and 1,836 schools, as well as nearly 900,000 public school students. CDE employs 56,000 teachers and 2,800 school administrators and is responsible for providing services to cooperative education services, early learning centers, state correctional schools, state libraries and other educational programs. To support statewide educational services, CDE houses its divisions and offices in six locations in Denver. All of these locations are connected into a single network infrastructure using a combination of WAN and wireless networks.

### The Challenge

CDE had an aging network infrastructure connecting its six downtown locations, and the network was starting to experience hardware failures. Much of CDE's networking equipment was at the end of its useful life. Furthermore, the network had grown organically, leading to suboptimal design and poor performance, and network management had become more challenging as the infrastructure continued to expand.

CDE also was increasingly relying on wireless networking to support mobile users. However, in addition to the unreliable network hardware, users were experiencing poor RF coverage and wireless dead spots. And there was no central access control for the wireless network, which the CDE IT team described as the "wild west" with limited rules and no enforcement.

It was clear that CDE's networking infrastructure was due for a refresh.

CDE had already been working with OneNeck® IT Solutions for different types of network support. In fact, in the last two-and-a-half years, OneNeck had become the "go to" service provider to address pressing networking issues. When CDE realized it was time to upgrade its enterprise network, they partnered with OneNeck to help them solve their connectivity problems.

### The OneNeck IT Solutions Answer

After performing a two-week network assessment, the OneNeck team ascertained that a network overhaul was clearly in order. The assessment highlighted the specific areas that required attention, and the team went to work, meeting regularly with CDE's IT team to address upgrade details, determining which systems had to be replaced and which systems could be repurposed. The most pressing problem was stabilizing the network and increasing available bandwidth.

"The assessment involved a lot of discovery with OneNeck, which led to us identifying the choke points," said Steve Berryman, Infrastructure Manager, IMS- Network Services for CDE. "The infrastructure was over 12 years old. We couldn't get support, and latency was becoming a big issue."

To solve these problems, it was decided to modify the entire infrastructure to conform to both industry and Cisco-recommended best practices. The systems refresh would span the campus core, user access and data center core/access pads. OneNeck also would create a central Cisco Prime Infrastructure that would include management of the wireless network.

It was clear that CDE needed more data capacity and better bandwidth management, including support for Ethernet networking speeds at 1 Gbps and 10 Gbps. Fiber was planned for all appropriate switches at the EDF/MDF (intermediate distribution frame/main distribution frame), but the real problem was that the switch network had continued to expand with little or no management. As a result, the spanning-tree protocol was disconnecting vital network links, thus wasting network bandwidth. Due to the organic growth of the network over time, there also was limited separation of failure domains. In essence, the entire CDE campus and data center were connected to share the same resources. If a single switch failed, it would bring down the entire network.



## Colorado Department of Education Summary

Organization	Colorado Department of Education
Industry	Education
Business Challenges	Aging Infrastructure Limited infrastructure management Suboptimal design Poor performance Wireless dead spots from poor RF coverage
User Environment	Six administrative locations 1,836 schools
Technical Environment	Cisco Identity Services Engine (ISE) Cisco Nexus Switches Cisco Catalyst Switches Cisco Wireless Access Points (APs)

The first order of business was to modify the network architecture and standardize network configuration. All the switches needed a consistent configuration to perform similar roles. The campus core and data center also needed to be reconfigured into a logical hierarchy with independent subdomains. Delineating network segments into failure domains would eliminate the risk of a single point of failure for the entire network, and it would simplify troubleshooting. In fact, with smaller failure domains in place, the infrastructure could suffer from multiple simultaneous failures and still maintain connectivity.

This network reconfiguration addressed some of the bandwidth constraints. However, to enhance throughput even more, OneNeck upgraded systems to take advantage of newer technologies to optimize spanning tree protocol topologies. New security protocols were introduced to control network access, including wireless access. The OneNeck team also installed Cisco's Identity Service Engine (ISE) to enforce security policies.

The network management system also had to be upgraded to provide more transparency and control over network resources, including the wireless network.

### OneNeck IT Solutions Does It All

OneNeck has been working with CDE for more than six years, but the network refresh project was clearly the largest initiative. The project was completed in 18 months, and as a result, OneNeck has become a trusted IT advisor for CDE. Following the successful completion of the upgrade, the IT team at CDE knows they can rely on OneNeck's expertise and commitment to customer service and satisfaction.

"OneNeck is very responsive," said Corey Kispert, Information Security Officer for CDE. "The engineers are up to speed on the products, and implementation always goes well. In addition, the follow-through and feedback is great. If we have problems later, we can always go back, and OneNeck is there to help."

## About OneNeck IT Solutions

OneNeck IT Solutions LLC offers hybrid IT solutions including cloud and hosting solutions, managed services, enterprise application management, advanced IT services, IT hardware and top-tier data centers in Arizona, Colorado, Iowa, Minnesota, New Jersey, Oregon and Wisconsin. OneNeck's team of technology professionals manage secure, world-class, hybrid IT infrastructures and applications for businesses around the country.

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