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SMART EDUCATION NETWORKS THAT PERFORM

FIVE STEPS TO SMART NETWORKS

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Smart Education Networks That Perform



Continual, Unending, Increasing Demands on Education Networks: The Modern CTO's Burden.

Once districts commit to digital transformation and begin implementing 1:1 initiatives, the nature of the performance requirements on their infrastructure changes dramatically:

- Capacity demand on education networks increases exponentially every year until maturity.
- Reliability requirements on networks approach "4 nines."
- With open BYOD, many networks are expected to support 3-5 student devices with anytime, anywhere access.

Superintendents are counting on their technology leaders to get high performance networks right in spite of uncertain funding.

As districts embark on digital transformation initiatives, they are recognizing that digital transformation is not an end goal, but rather it is only the beginning. By creating robust technology and human infrastructure, districts are creating not a final end state, but a platform for continual evolution. Technology and Education Science are in a virtuous spiral which, if allowed, will lead to the ongoing evolution of teaching and learning environments. Internet access, affordable video and content creation and sharing, secure collaboration platforms, and promising (if still immature) digital content have prompted experimentation and shifts in educator practice such as technology-rich project based learning, mastery-based learning, and flipped classrooms. These early and simple technologies have already driven exponential growth in the demand for network capacity and reliability yet there are even more transformative technologies on the horizon, including innovations in data visualization and dashboards (both 3d party and educator-created); embedded digital formative assessment; immersive, adaptive digital content; interoperability infrastructure; and more. There is no end in sight for the co-evolution of technology and education, nor for the demands on education networks and infrastructure.

District technology leaders are being asked to build and maintain the technology infrastructure required for digital transformation, even as the practice of teaching and learning with technology is rapidly changing and network technology is evolving just as quickly. District leaders are faced with making high-stakes infrastructure investment decisions in an uncertain environment. This guide provides insight into key considerations in designing for network performance and shares how leading, successful districts are setting performance goals for their networks, architecting their network to maximize the sustainability of their investments, and making technology choices that will remain current rather than be quickly obsolete.

Network Performance Goals

Three key performance goals drive the design of education networks:

- **Capacity:** Usually measured in Mbps/1000students, the required bandwidth capacity of school Internet Access, LAN's and WAN's are the biggest driver of network design and purchasing decisions.
- **Reliability:** Measured as the average amount of unscheduled down time experienced by the system, reliability has become a more significant driver of network design as the Internet has become increasingly mission critical to instruction and operations.
- **Mobility:** The need to support student access from home or other places outside school drives network design decisions which can eventually support anytime/anyplace access for students. At the same time, the prevalence of BYOT programs in lieu of or in addition to district-supplied 1:1 programs is dramatically increasing the number of devices that networks need to support as well as creating new questions regarding security models.

Although most districts are beginning to architect their networks in support of anytime/anyplace access from district and/or personal devices, the cost of providing network access everywhere students go beyond the school campus is still sufficiently high that most districts don't attempt it, though there are numerous mitigation strategies to increase the equity of access. As digital equity issues become more prominent and the cost of providing ubiquitous access decreases, the requirement for anytime/anywhere access for all students will continue to increase.

Implications of Network Performance Goals

As the aggregate requirements for capacity, reliability, and mobility on school networks become sufficiently large, traditional network architectures and management become unable to provide the needed levels of performance. At the same time, when demand is sufficiently aggregated, cost-effective alternatives to traditional Internet Access and network management approaches often become possible.

Setting the wrong performance goals leads to making investments that are either inadequate, requiring that those investments be scrapped, or overkill, meaning that funds are tied up in technology that is not being used. The key to [Setting Performance Goals](#) for your district is to recognize that those goals lie on an exponential growth curve until the district usage of 1:1 technology matures.

The [Network Design Insights](#) pages share short videos where leading districts share their experiences with network growth over time.