CoSN
LEADING EDUCATION INNOVATION

Smart Education Networks
by Design
a CoSN leadership initiative

Checklist for School System Chief Technology Officers

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☑ SEND Checklist:

USE: For CIOs, CTOs, superintendents and other school technology leaders in designing smart education networks in your community	Describe current state	Describe desired state/ goal	Describe action steps/ resources needed and person/position responsible
☐ ALIGNMENT & INTEGRATION with district vision, mission & goals			
☐ Ensure that all stakeholders have participated in developing a clear vision of digital transformation with goals & have recognized the impact upon & importance of the network in supporting the vision & mission. **p. 8**	▪ ▪ ▪ ▪	▪ ▪ ▪ ▪	▪ ▪ ▪ ▪
☐ Provide clarity in the district action plans to build networks that allow for a robust integration of the power of technology not only into the curriculum, teaching & learning practices, but also into professional development & in the administrative practices & systems that serve the staff and the public. **p. 8**	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪
☐ DEFINING PERFORMANCE requirements			
☐ Network design should be determined by requirements stemming from the vision, mission & goals. The key users of the system - the teaching and learning function & the district operations function - generally determine these requirements. **p. 25**	▪ ▪ ▪ ▪	▪ ▪ ▪ ▪	▪
☐ GAP AND DATA analysis			
☐ Conduct a gap analysis to determine & inform the functional & technical enhancements necessary for the network. **p. 26**	▪ ▪ ▪	▪ ▪ ▪	▪
☐ Collect & examine data such as inventory & its age, elaborated network traffic analysis at multiple points in the network & time of day & year, help desk records, etc. If the district does not have network data or the capacity to collect it, consider contracting to gather these data over an extended period. **p. 26**	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪

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	Describe current state	Describe desired state/ goal	Describe action steps/ resources needed and person/position responsible
☐ DESIGN for success			
☐ **WAN/LAN topology or services are resilient. Consider private fiber-based networks or scalable services from providers. Establish risk tolerance & performance metrics. p. 26**	▪ ▪ ▪ ▪	▪ ▪ ▪ ▪	▪ ▪ ▪ ▪
☐ **The network core should be scalable & of sufficient capacity for the planning period. All components in the network core must be correctly sized to accommodate the services needed & traffic anticipated. Consider designs such that components within the core able to be upgraded as needed. p. 36**	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪
☐ **The network "edge" (schools and classrooms) should have fiber connections to & between wiring closets with Category 5e (legacy connections) or Category 6 cabling for new wired connections (computers, access points, etc.). New wireless technology may require two Ethernet Category 6 cables in order to maximize performance. p. 37**	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪
☐ **For wireless applications, ensure that sufficient power through Power over Ethernet (PoE), PoE+, or vendor-specific power technology is available. p. 37**	▪ ▪ ▪	▪ ▪ ▪	▪ ▪ ▪
☐ **Wireless effectiveness is determined by coverage & capacity. A wireless survey is essential for all spaces in which mobile access is planned. Consider 802.11n & 802.11ac as the best in-school technology & mobile broadband (3G/4G/LTE) for access when away from school. pp. 34, 42, 49**	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪
☐ **Understand the barriers caused by certain construction materials. In new construction, consult with the engineers to mitigate impairments for certain wavelengths. p. 45**	▪ ▪ ▪	▪ ▪ ▪	▪ ▪ ▪

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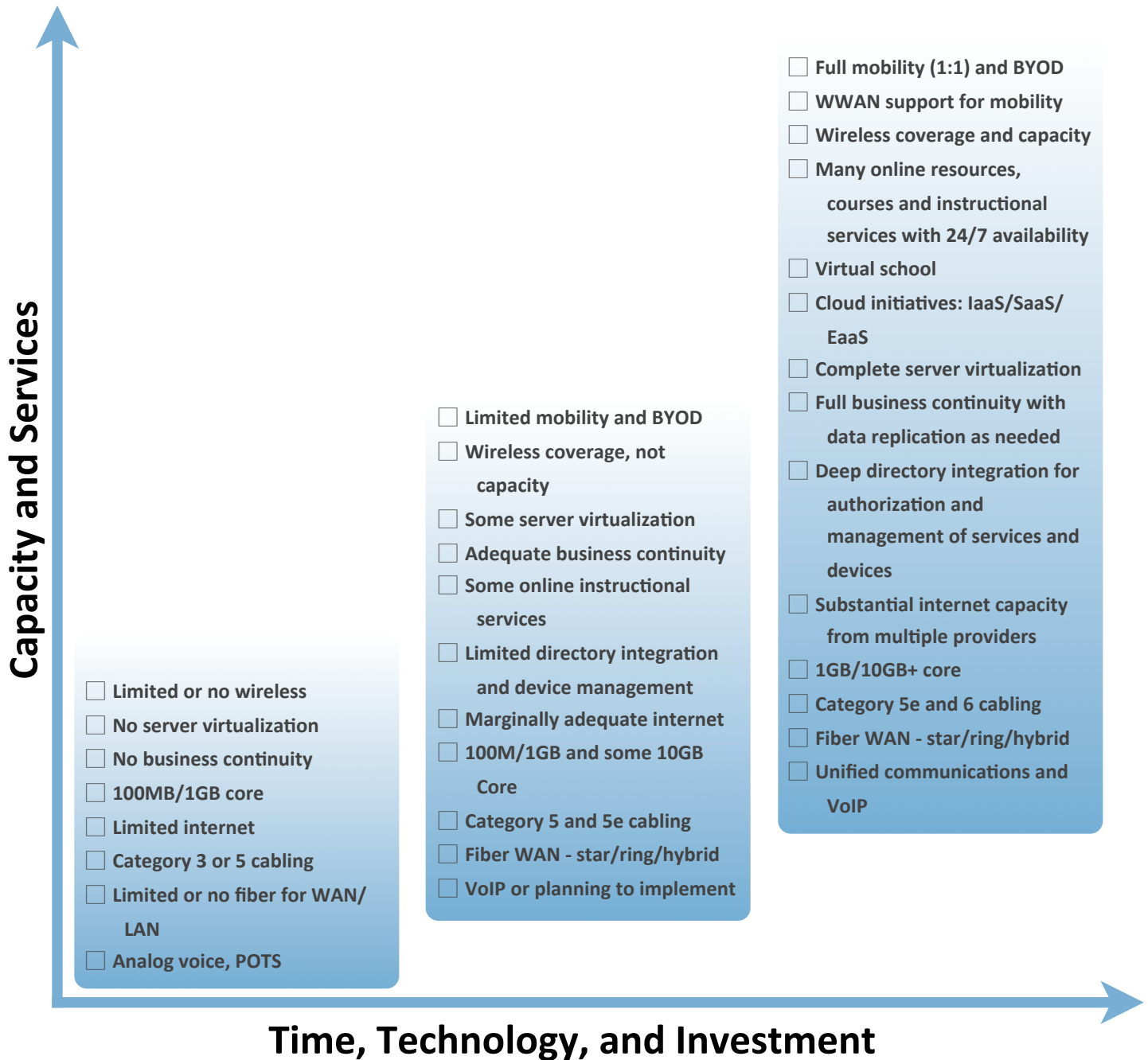|	Describe current state	Describe desired state/ goal	Describe action steps/ resources needed and person/position responsible
☐ **ADEQUATE & ROBUST INTERNET** is essential			
☐ **Internet capacity should be significant and may be obtained from multiple providers if necessary. State and regional networks, possibly with Internet 2 connections, are options if available in the community. Consider multiple carriers or other strategies for redundancy. p. 30**	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
☐ **Internet service, & related or supportive technologies, must now be viewed as any other important utility used by the school by providing an adequate line item budget to match the needed capacity. p. 30**	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
☐ **MANAGING & OPERATING** the network			
☐ **Consider separate VLANS for students & ensure sufficient address space since multiple devices per person are increasingly common & software applications are requiring more addresses & ports. Review segmentation of employee network & student networks with VLAN strategies to increase security of essential district data, systems & confidentiality requirements. p. 35**	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■
☐ **Design for and implement end-to-end Quality of Service (QoS) to support latency-sensitive applications. p. 30**	■ ■ ■	■ ■ ■	■ ■ ■
☐ **Monitor the performance of the network at all critical points & intervene as necessary. p. 30**	■ ■	■ ■	■ ■
☐ **Automate the management of mobile devices using MDM technologies. pp. 40, 47**	■ ■	■ ■	■ ■
☐ **Implement an Identity and Access Management (IAM) system to help secure the network & minimize operating expenses. p. 46**	■ ■ ■	■ ■ ■	■ ■ ■

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PROTECTING privacy & data			
☐ Use technology where appropriate to ensure that district is complying with the law e.g., CIPA, COPPA, FERPA, HIPPA, PPRA, etc. & that data, either possessed by the district or, increasingly, by partners, are secure. **p. 44**	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪
☐ Implement rigorous wireless security measures such as WPA2, RADIUS, etc. as mobility & BYOD become prevalent. **p. 45**	▪ ▪ ▪	▪ ▪ ▪	▪ ▪ ▪
☐ Implement Intrusion Prevention/Detection technologies to minimize threats as the use of Internet-based resources increases. **p. 45**	▪ ▪ ▪	▪ ▪ ▪	▪ ▪ ▪
TEACHER training & technical support			
☐ Even with the implementation of smart network designs, the district commitment to fund training and ongoing support is critical. Teachers are the primary providers of digital transformation and they must be trained and adequately supported. Similarly, technical support staff must also receive training. **pp. 14, 46**	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪ ▪
BUDGET & investment			
☐ Supporting the vision, mission & goals of digital transformation & the smart networks necessary to enable & sustain the transformation requires sufficient budget funds, a continuing investment in success. **p. 8**	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪	▪ ▪ ▪ ▪ ▪

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Progression of K-12 Networks

Checklist activity: **Where are you (the district) on this progression?**

Capacity and Services ↑

Time, Technology, and Investment →

Full mobility (1:1) and BYOD
☐ WWAN support for mobility
☐ Wireless coverage and capacity
☐ Many online resources, courses and instructional services with 24/7 availability
☐ Virtual school
☐ Cloud initiatives: IaaS/SaaS/ EaaS
☐ Complete server virtualization
☐ Full business continuity with data replication as needed
☐ Deep directory integration for authorization and management of services and devices
☐ Substantial internet capacity from multiple providers
☐ 1GB/10GB+ core
☐ Category 5e and 6 cabling
☐ Fiber WAN - star/ring/hybrid
☐ Unified communications and VoIP

☐ Limited mobility and BYOD
☐ Wireless coverage, not capacity
☐ Some server virtualization
☐ Adequate business continuity
☐ Some online instructional services
☐ Limited directory integration and device management
☐ Marginally adequate internet
☐ 100M/1GB and some 10GB Core
☐ Category 5 and 5e cabling
☐ Fiber WAN - star/ring/hybrid
☐ VoIP or planning to implement

☐ Limited or no wireless
☐ No server virtualization
☐ No business continuity
☐ 100MB/1GB core
☐ Limited internet
☐ Category 3 or 5 cabling
☐ Limited or no fiber for WAN/ LAN
☐ Analog voice, POTS

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