CROWN CASTLE | FIBER

Educational Private Fiber Optic Network

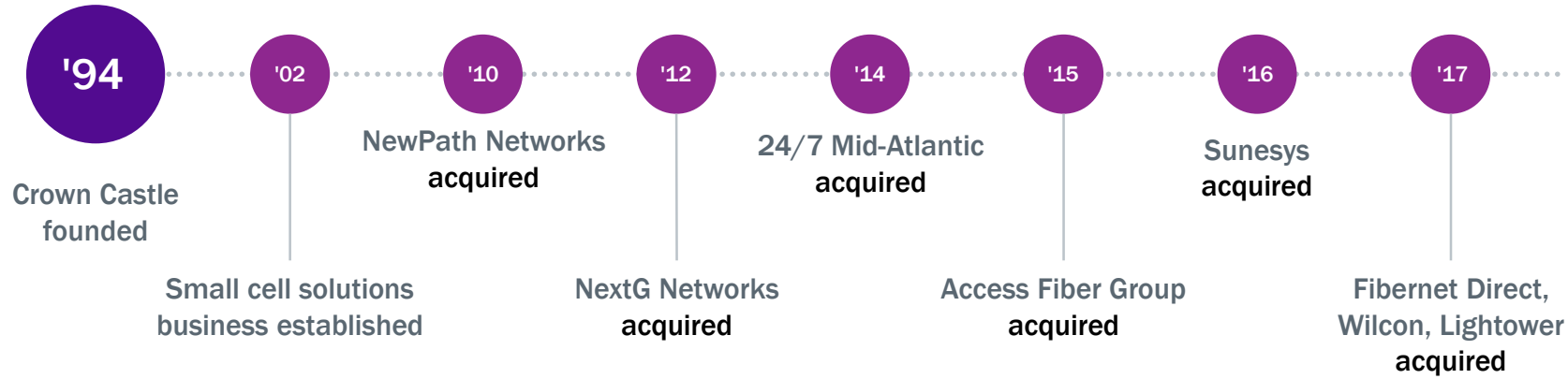
Advantages

JUNE
2020

The pathway to possible.

The right solution for your Schools —today and tomorrow.

We've spent over 20 years growing our network and strengthening our expertise.



A comprehensive portfolio of infrastructure that is **unique** and **unmatched**.

50,000
towers

70,000
small cells on air or under contract

75,000
route miles of fiber

Our strength and stability help us deliver long-term value.

$7B+
annual revenue

NYSE S&P 500
Fortune 500 company

20+ YEARS
of owning and operating network assets

LAST OWNER
of our network assets

Introduction to Crown Castle Fiber

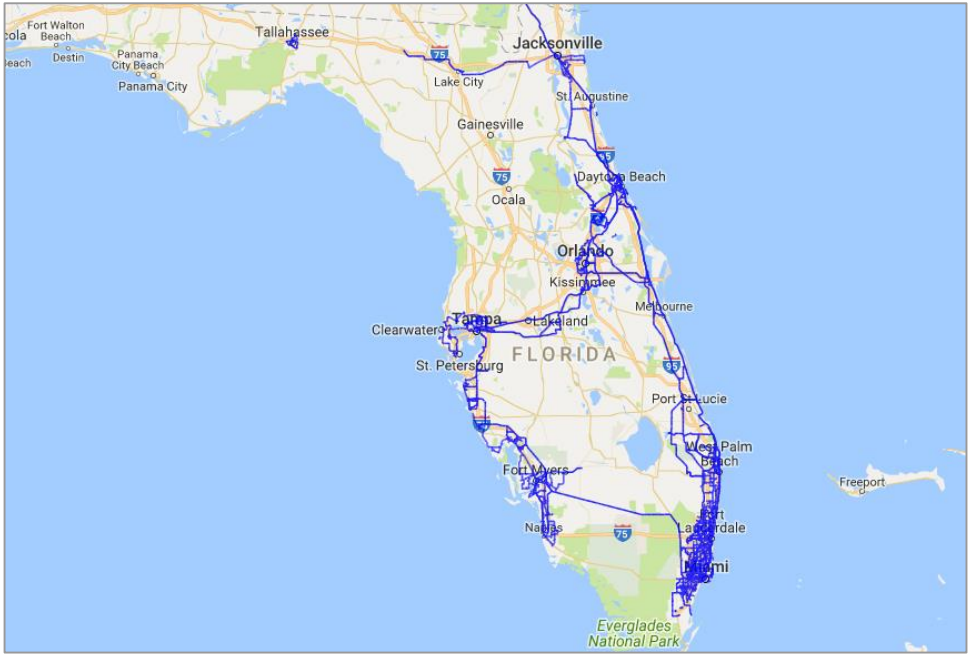
- A national telecommunications service provider
- Build and maintain the customized fiber networks that keep Districts, Educators and Students connected
- Offer Managed WANs, Dark Fiber and Internet solutions with DDoS Option
- Designed, built and managed complex E-Rate solutions for 330+ school districts and libraries systems since the inception of the USAC program in 1997
- Billed $85M+ in revenue for Category 1 E-Rate services in 2019

Our reach: Over 320 school districts supported by 75,000+ miles of fiber.

Registered Utility in the State of Florida 100% ownership of fiber footprint.

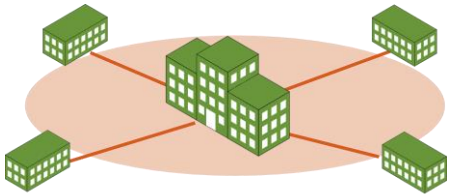
Statistics

- 6,224 miles of fiber
- 5 school districts



K-12 Bandwidth Needs

K-12 Broadband Needs*



Private Fiber WAN

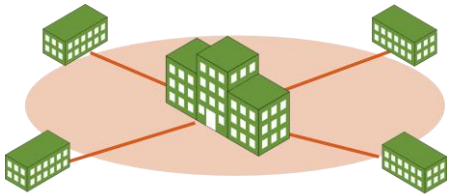
Public "Commodity" WAN

201?/19 Target	100Mbps per 1000 students/staff	1Gbps per 1000 students/staff
2020/21 Target	1Gbps per 1000 students/staff	10Gbps per 1000 students/staff

* Source: http://www.setda.org/wp-content/uploads/2013/09/SETDA_BroadbandImperative_May20Final.pdf

Advantages of the Private Fiber WAN

Private v. Public: What's the difference?



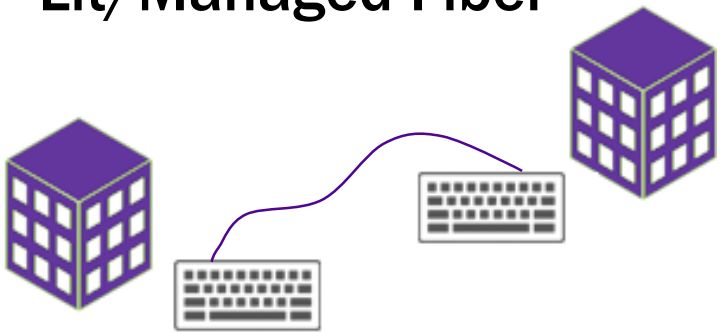
Private Fiber WAN

Public "Commodity" WAN

Reliability	Dedicated fiber strands and no public switches provide fewer points of failure.	Public switches, oversubscription, and shared infrastructure lead to potential for failure points, difficult remediation, and QOS support issues.
Security	Internal data never passes through any public switches.	More points of access mean greater change of a security breach.
Flexibility	Equipment can be swapped out for instant upgrades–100Gbps or more.	Bottlenecks in network may limit upgrade availability and timing.
Cost-efficiency	Seamlessly consolidates voice, internet and data over one network.	Individual services are often contracted to each location, leading to potentially costly and confusing invoicing.

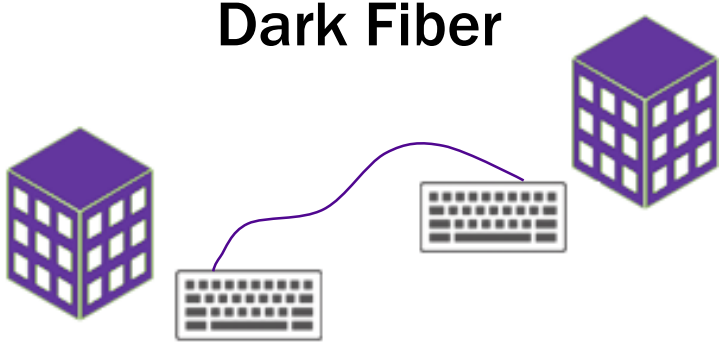
Lit/Managed Fiber vs. Dark Fiber

Lit/Managed Fiber



District leases bandwidth from a service provider.

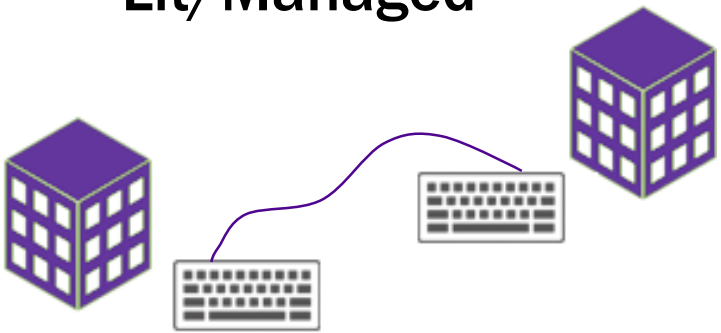
Dark Fiber



District leases dark fiber strands from a service provider and uses district-owned equipment to light the network.

Lit/Managed Fiber

Lit/Managed

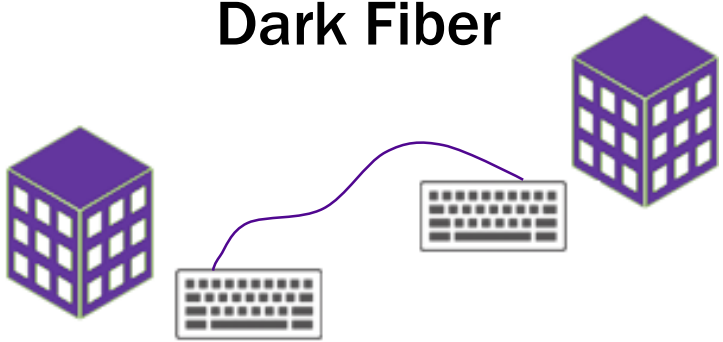


District leases bandwidth from a service provider.

Provides the District with an ultra-available and easy to operate WAN. "Simplistic" design with SLA guarantees provide a platform that "just works."

- Dedicated strands of fiber
- Layer 2 solution
- Scalable from 500Mbps to 100Gbps
- Traffic agnostic
- Direct SPF plug-in to existing switches

Dark Fiber



District leases dark fiber strands from a service provider and uses district-owned equipment to light the network.

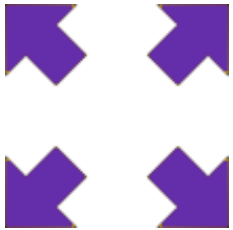
Offers the District an unrestricted, ultra-scalable WAN for districts that need total control.

- Dedicated strands of fiber
- Layer 0 solution
- Scalable from 100Mbps to 100Gbps+ at any time
- Traffic agnostic
- Total Cost of Ownership (TCO) can yield cost savings

The Private Network Advantages

Secure, reliable, flexible connectivity

- Dedicated fiber strands.
- Full bandwidth throughput to the edge of data transport/IP distribution.
- Flexibility of protocol and services.



Future-proof unlimited bandwidth

- Provides unlimited bandwidth, unmeasured usage & network expansion.
- Upgrade equipment at any time in any locations.

Substantially lower cost per incremental bit

- ROI meets board's consent not previously experienced with prior vendor metro services.
- TCO yields long-term cost savings.

Private Fiber Network Attributes

The CCF Private Fiber infrastructure assures the highest level of security, performance and reliability.

Supports your ERP integrated management of core business processes. Collect/store/manage data.

Your District's Data transport stream never passes through any public switching station or central office (COs) which greatly reduces vulnerability and network intrusion.

The Private / Dedicated optical platform is highly secure, scalable & extremely efficient.

Private Fiber Network Attributes

Inherent Feature / Benefits:

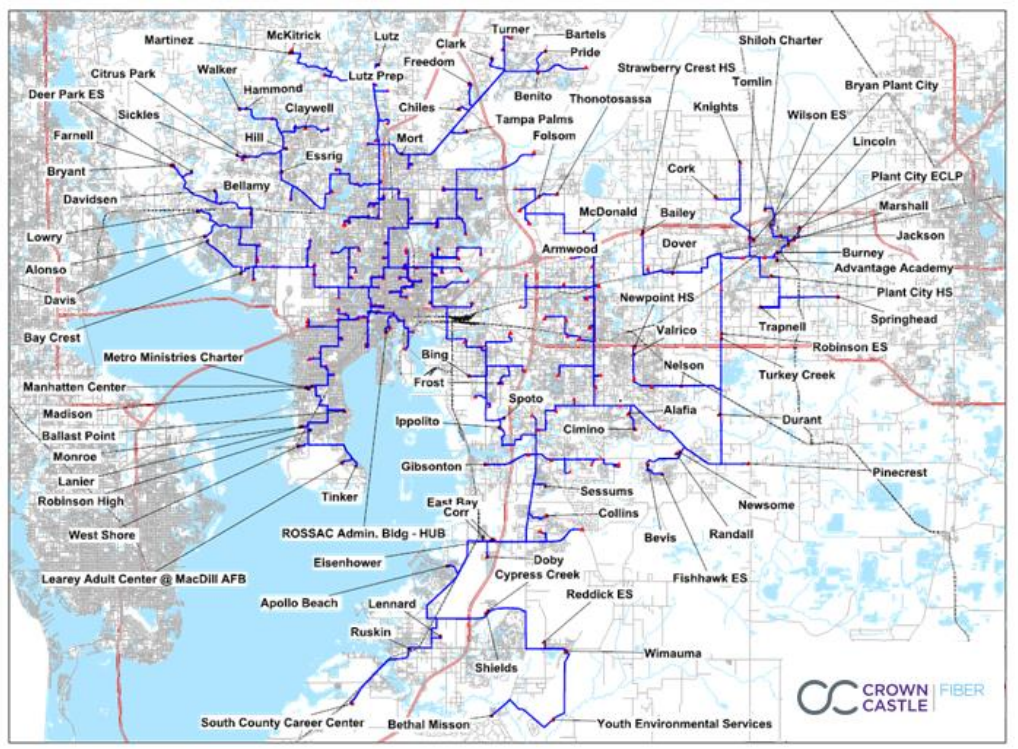
- Enables control to IT Management through unlimited bandwidth as needed, unmeasured usage and network expansion over Future proof / Evergreen infrastructure architecture.
- Impacts all Departments across the District. Efficiently supports Full bandwidth throughput of Data transport / IP distribution. All with no monthly invoice reconciliation labor hours.
- Enables & Supports full Data transport, VoIP, TDM, HD Video streaming & HD Video conferencing, Centralized server arrangement, DRC connectivity & real-time Server replication / SAN.

Private Fiber Network Attributes

- Facilitates Security camera / centralized DVR connectivity & distribution.
- Extremely low latency and expected packet delivery across the Ultra-available dedicated / home run fiber strands.
- Guarantee 100% full bandwidth throughput to the Edge, specifically engineered and dedicated to the District's sole use.
- Return on the District's financial investment while meeting the obligation of the Board's consent not previously experienced with prior Vendor Switched Metro services.
- 100% Category 1 E-Rate compliant, Monthly lease cost to the district includes the service, installation and on-going SLA backed maintenance for the life cycle of the term.

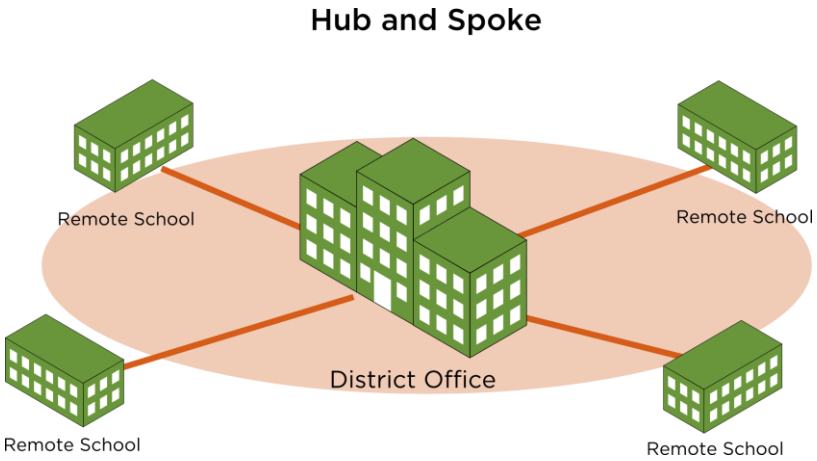
Typical Private Network: A Case Study

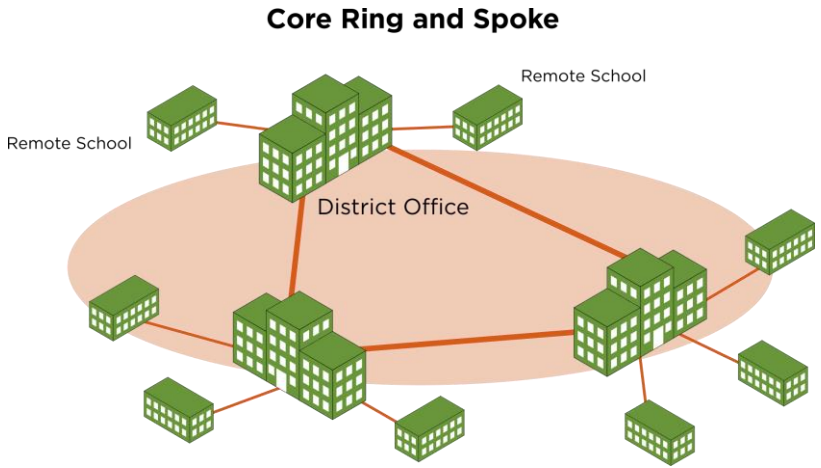
Typical Florida Private Metro network design.



Hillsborough County
SD WAN

Robust network topologies increase resiliency at the aggregation and core layer.



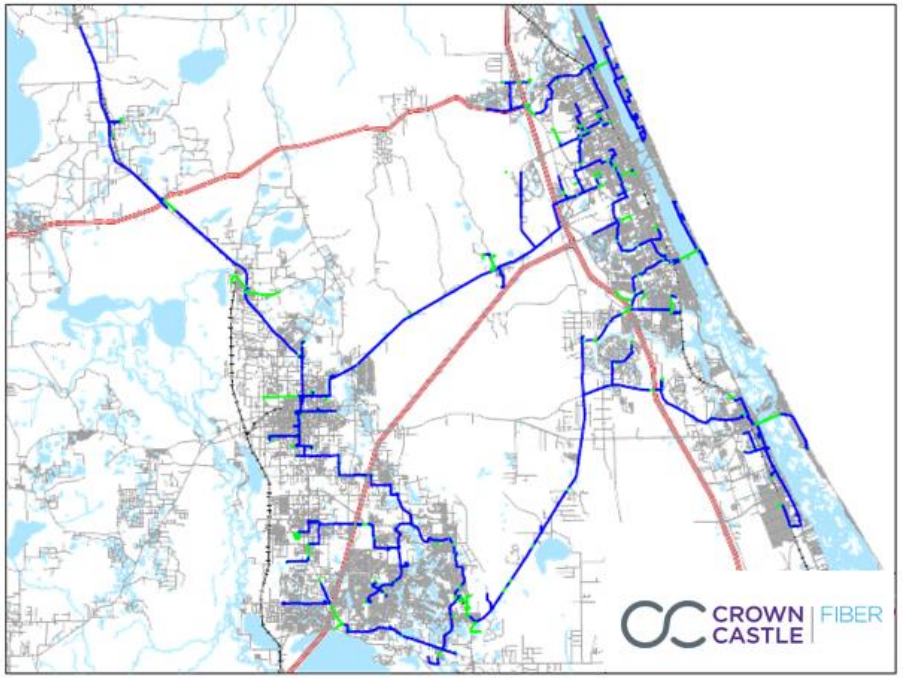


Our Success Stories

Volusia County Public Schools | DeLand, FL

- 62,000 students; 7,300 employees
- 93 locations
- 1Gbps and 10Gbps hybrid Managed Private Ethernet solution between 93 district sites
- Customer since 2008

VOLUSIA COUNTY SCHOOLS



Volusia County School District WAN

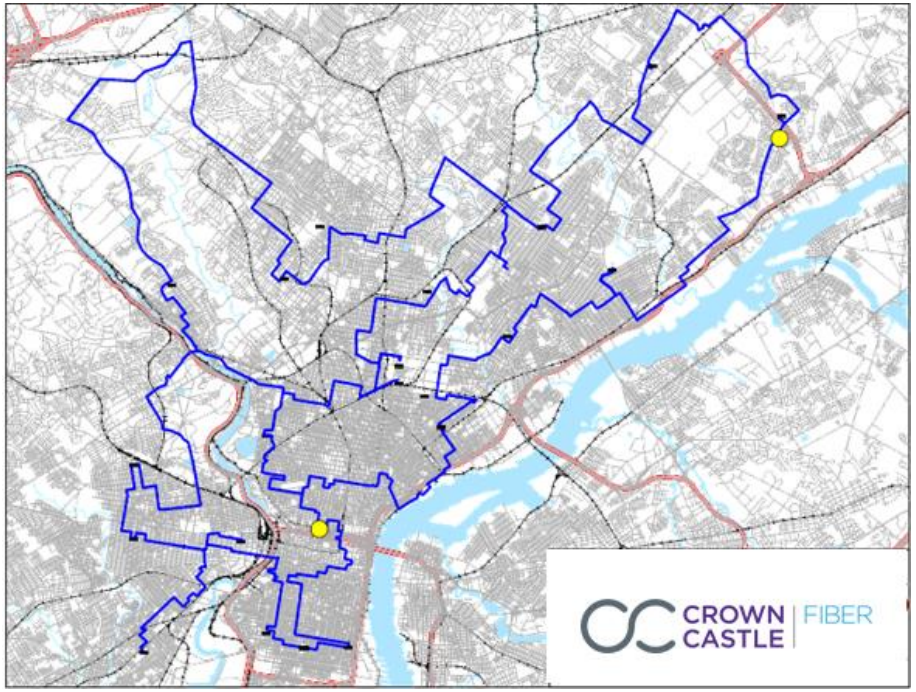
Charlotte County School District | Charlotte County, FL

- 14,548 students
- 23 locations
- 1Gbps private Fiber Ethernet solution between 22 districts sties
- Customer since 2016

CHARLOTTE COUNTY Public Schools

School District of Philadelphia | Philadelphia, PA

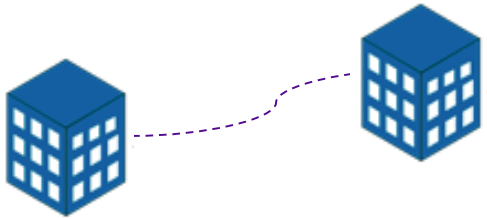
- 7th largest District in the nation, by enrollment
- 131,000+ students; 18,000+ employees
- Dark Fiber solution between 310+ district sites
- Customer Since 2001



School District of Philadelphia WAN

Network Monitoring & Maintenance

24 x 7 x 365 Monitoring for Lit Fiber Networks.



24x7x365

All Crown Castle Fiber lit networks are monitored 24x17365. Here's who is watching what:

CROWN CASTLE | FIBER

The Crown Castle Fiber NOC maintains constant oversight of the NOC and keeps in contact with the contracted NOC providers. Crown Castle Fiber uses outsourced NOC providers to leverage their experience and expertise.

NETSERVE365

NetServe365 has worked with for Crown Castle for several years on our K-12 and other stand-alone WANs. NetServe365 has an intimate knowledge of Crown Castle Fiber networks, protocols, and equipment.

GLOBALCAPACITY

Global Capacity monitors our SunTran Data Center Transport Network and associated services.

Best-in-class Service Level Agreement.

- Network availability
  - 99.95% uptime unprotected circuits
  - 99.99% uptime protected circuits
  - 10ms latency roundtrip
- 99.95% packet delivery
- Mean time to repair - 4 hours
- Expect 5 step escalation list starting w/NOC supervisor

Thank you

For further information please contact:

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