

FIBER NETWORK DESIGN CONSIDERATIONS FOR RURAL BROADBAND



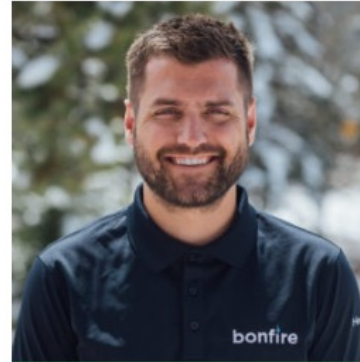
DON DODGE

JKL Associates: COO



JOHN MONDAY

HR Green: Group Director,
Broadband Design & Network
Engineering



DREW PAPPAS

Bonfire: Director of Business
Development



DOUG SEACAT

Clearnetworx: Founder &
President



MODERATOR

JOHN GEORGE

OFS Senior Director, Solutions Engineering and Fusion Splicers

•3:15 pm to 4:00 pm

•Plaza Court 8



10 Amazing Years
30+ State Broadband Offices
1200+ Professionals
ONE Mountain Connect

AUGUST 5-7, 2024 | SHERATON DOWNTOWN | DENVER, COLORADO



P.O. Box 80046 Billings, MT 59108 • Phone 406-248-6867 • Fax 406-248-6869

JKL is a full service Outside Plant General contractor, and subsidiary of PUSH Inc..

JKL performs construction on telecom projects throughout the United States.

JKL estimates, manages and performs construction on all phases of OSP construction including aerial, buried, directional drilling, service wire, placing and splicing..

This includes FTTH, Long Haul, Middle Mile, Road Moves, Relocates and general maintenance.

JKL has partnered with and assisted various Telcom/Groups with designs, pre-grant and preconstruction budgets, value engineering and project management.

HR GREEN - Nationwide Experience...Local Resources

- 111 years of multi-faceted consulting services
 - 750+ employees and offices in nine states
- ENR's top 500 design firm (#173) in the United States
 - Broad footprint throughout Colorado

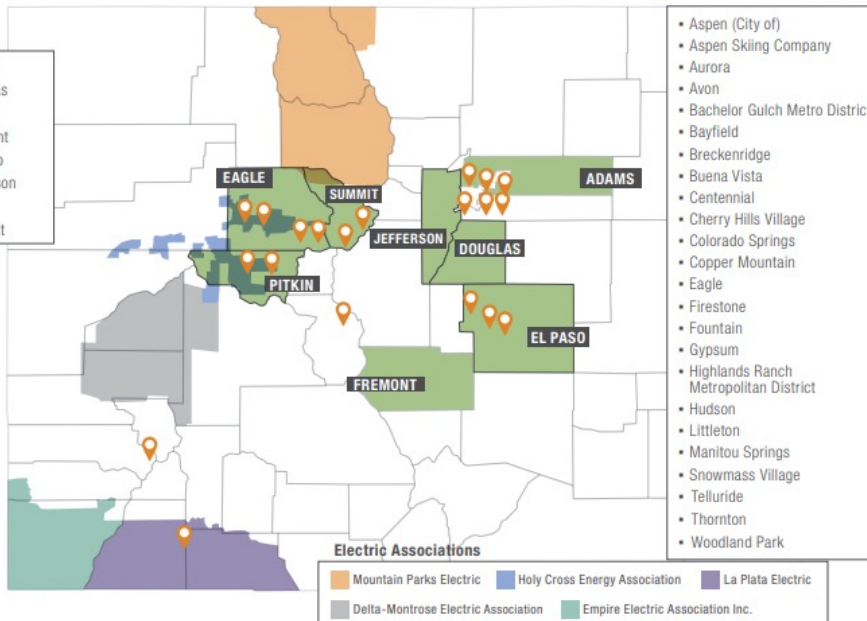


HR GREEN FIBER AND BROADBAND CLIENTS IN COLORADO

LOCAL AGENCIES

COUNTIES

- Adams
- Douglas
- Eagle
- Fremont
- El Paso
- Jefferson
- Pitkin
- Summit



- Aspen (City of)
- Aspen Skiing Company
- Aurora
- Avon
- Bachelor Gulch Metro District
- Bayfield
- Breckenridge
- Buena Vista
- Centennial
- Cherry Hills Village
- Colorado Springs
- Copper Mountain
- Eagle
- Firestone
- Fountain
- Gypsum
- Highlands Ranch Metropolitan District
- Hudson
- Littleton
- Manitou Springs
- Snowmass Village
- Telluride
- Thornton
- Woodland Park

- Electric Associations**
- Mountain Parks Electric
 - Holy Cross Energy Association
 - La Plata Electric
 - Delta-Montrose Electric Association
 - Empire Electric Association Inc.

OUR SUCCESSFUL BROADBAND TRACK RECORD IN COLORADO

35+ Colorado Agencies Served in 8 Counties

HR GREEN'S BROADBAND CAPABILITIES

Strategic Policy Development & Implementation	Core Equipment & Architecture Design	Telecommunications Network Design
Regional Collaboration	Master Planning & Engineering	Project & Program Management
Operational Modeling	Business Model Assessment	Construction Management
Telecommunications Co-Location Consulting	Grant Writing & Administration	Smart Grid Analysis
Regulatory Compliance	Business Case Needs Assessment	Smart Grid Design & Implementation
Community Engagement	Market Assessment	Street Lighting Analysis & Design
ITS Design & Implementation	GIS Mapping	Fiber Capability Evaluation

**Unleashing
Market Potential
through our
Proven Process:
Bringing High-
Speed, Affordable
Fiber based
broadband to
Every American
Corner**



clearnetworkx

+

DEEPLY DIGITAL

FIBER COMMUNITIES

Bayfield

Colona

Cortez

Delta

Durango

Electra Lake

Fruita

Grand Junction

Gunnison

Loghill

Montrose

Mountain Village

Norwood

Nucla

Olathe

Ouray

Palisade

Redvale

Ridgway

Telluride


COLORADO
SUPPORT + OPERATIONS

100% WESTERN SLOPE BASED

200 SLOPERS

 IN-HOUSE DESIGN
EXPERTS

Fiber Design
GIS & Asset Management
Engineering
Construction

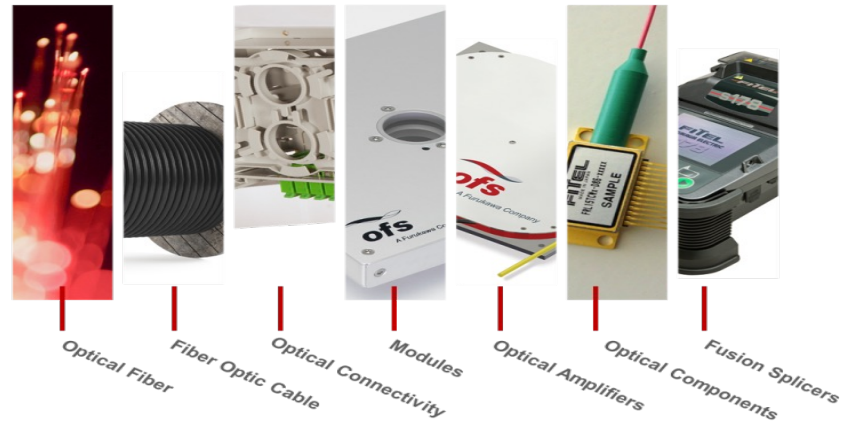
2024
\$30+ MILLION
GRANT FUNDING AWARDED

\$70 MILLION
INFLIGHT RURAL FIBER PROJECTS

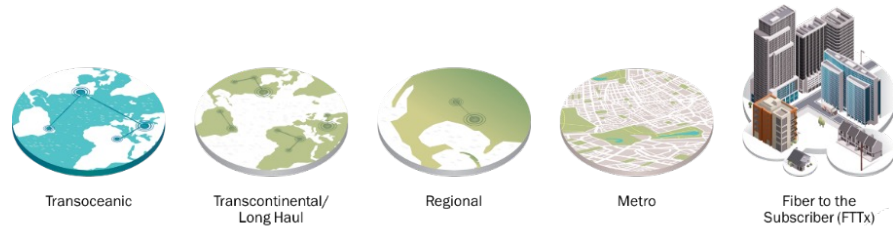
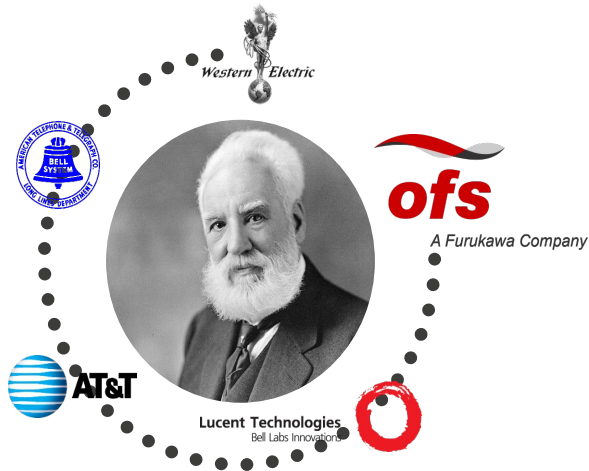

PUBLIC PRIVATE
PARTNERSHIPS

XGS-PON
FUTURE PROOF NETWORKS

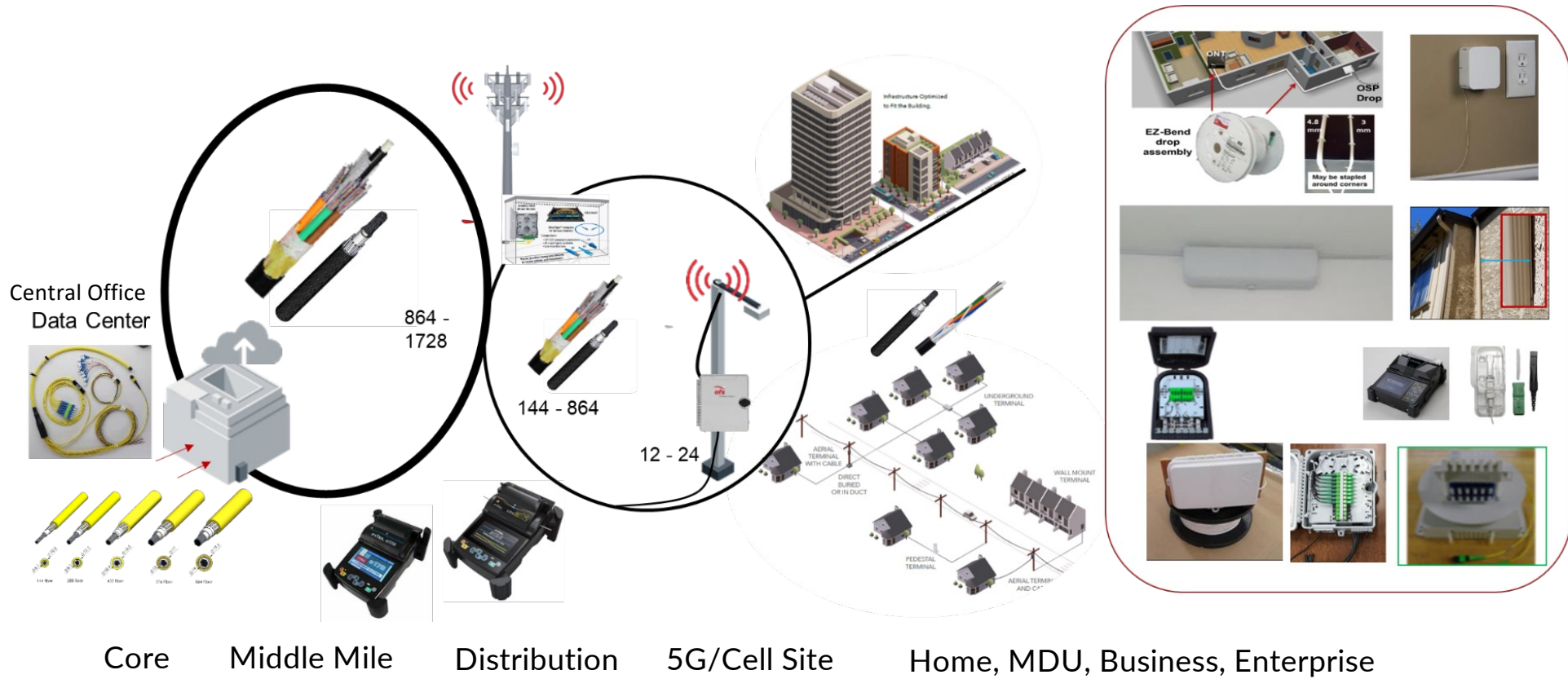
> OFS Designs, Develops, Manufactures Optical Fiber Solutions



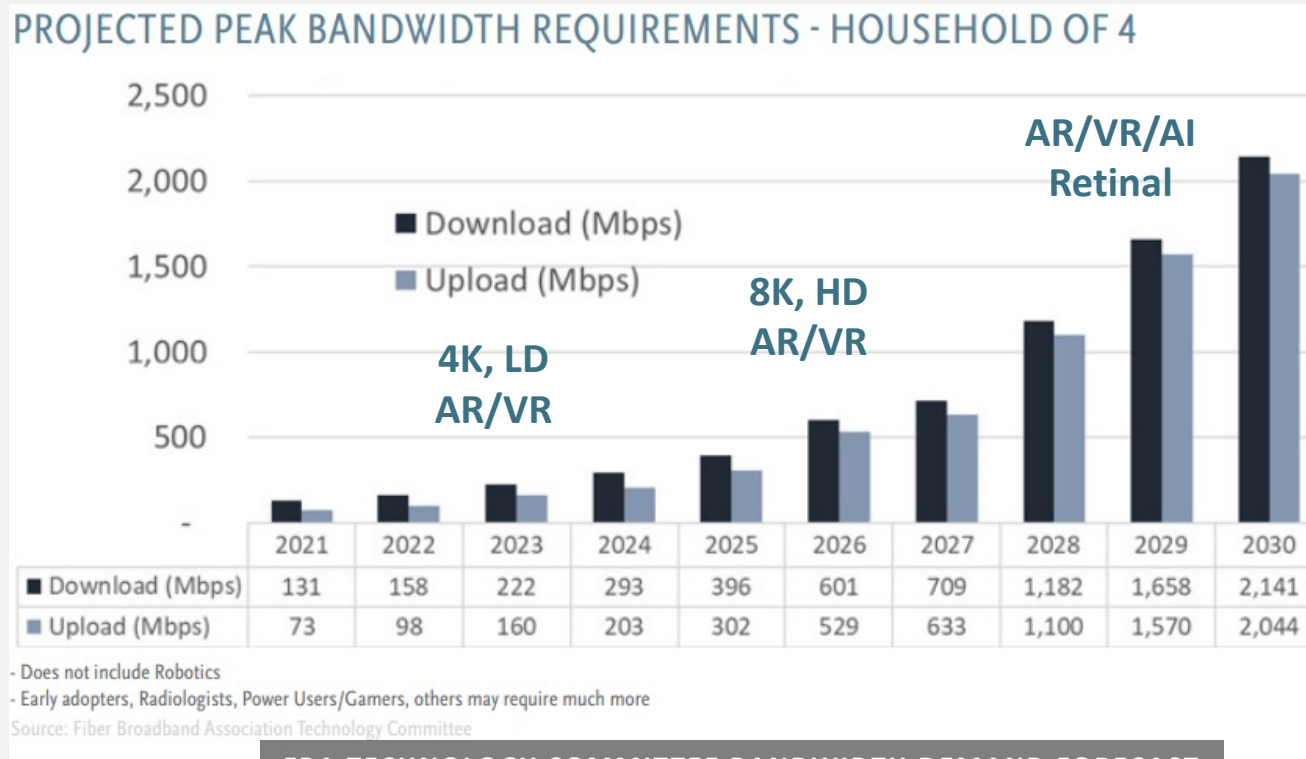
- \$1.8B Communications Solutions Business
- Supply leading Communication Service Providers U.S. and Worldwide
- 600 Million KM of Fiber Manufactured since the 1970s
- Original inventor of fiber, fiber optic cable, connectivity.
- BABAA Compliant Products available for BEAD and other Federal Programs



Fiber Network Design Considerations for Rural Broadband



Demand Heading Toward Multi-gig Symmetrical



FBA TECHNOLOGY COMMITTEE BANDWIDTH DEMAND FORECAST

2040		
15%	23%	30%
8,660	16,966	29,510
8,223	16,198	28,174

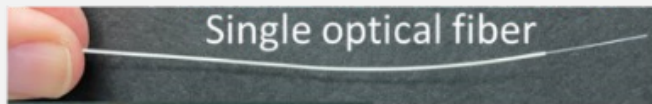
Fiber Offers Unmatched Capacity and Lowest Latency

Data Rate – bits per second

How much information per second

Video/AR/VR/MR/3D

- 600 Tbps (600,000 Gbps) capacity on one fiber
 - Full Spectrum
 - Capacity known today, may increase
- 60,000 times today's widely deployed 10 Gb/s
- 20,000 times what might be needed in 2040
- >1000 times any other technology

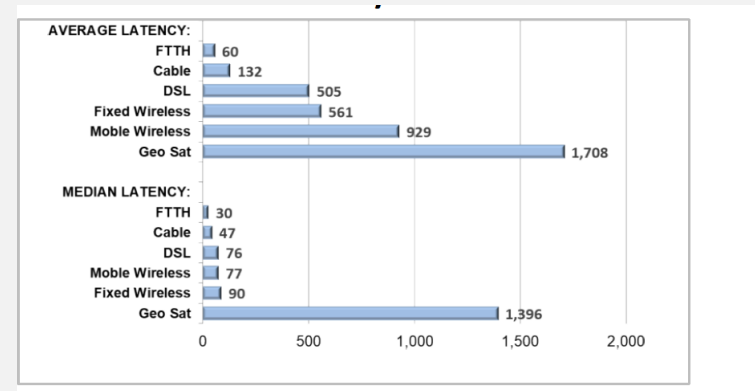


Latency - milliseconds

Reaction time

Gaming/AR/MR

- 2 times faster than HFC/Cable
- 3 – 9 times faster than Wireless



Source: RVA Inc 2023

FIBER NETWORK DESIGN CONSIDERATIONS FOR RURAL BROADBAND

1 – FTTH v. FWA and other technologies – where do you see each used in Rural Broadband and why?

2 – What options do you see for designing the fiber portion of rural broadband networks

FTTH Architectures – PON vs. P2P

Centralized vs. distributed splitting



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FIBER NETWORK DESIGN CONSIDERATIONS FOR RURAL BROADBAND

3. How do we design the fiber portion of rural networks to be future ready?

a. Fiber as an asset for future expansion/leasing.

b. Fiber Counts

c. Duct capacity

4. FTTH vs. FWA future readiness?



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5. For Govt funded projects/proposals, when should service providers begin designing a rural broadband network?
6. How do you account for supply chain in a design?



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7. Case Studies – How have you or your clients succeeded designing and building Fiber Networks for Rural Broadband? Lessons learned?

8. What resources are available for service providers to design rural broadband networks?



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