5G Compatible High-Speed Private Networks

AZBSN – COVID-19 Task Force

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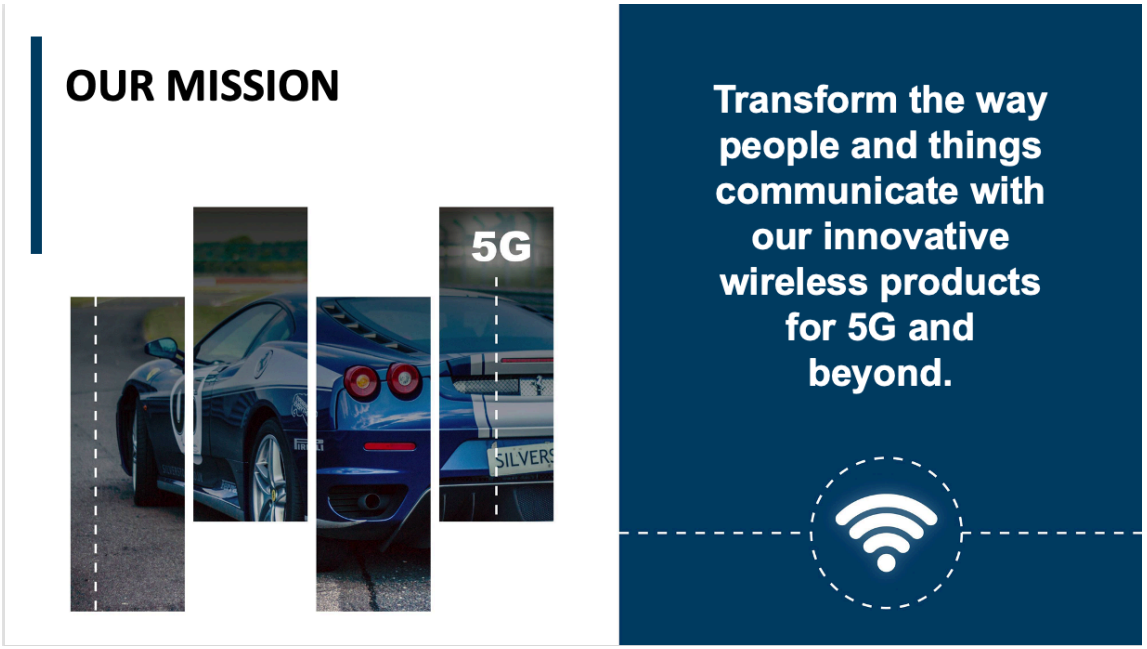
Background

- Disruptions to lifestyle patterns due to stay at home orders during the COVID-19 pandemic have raised awareness of shortcomings in the way we have approached and considered telecommunications infrastructure

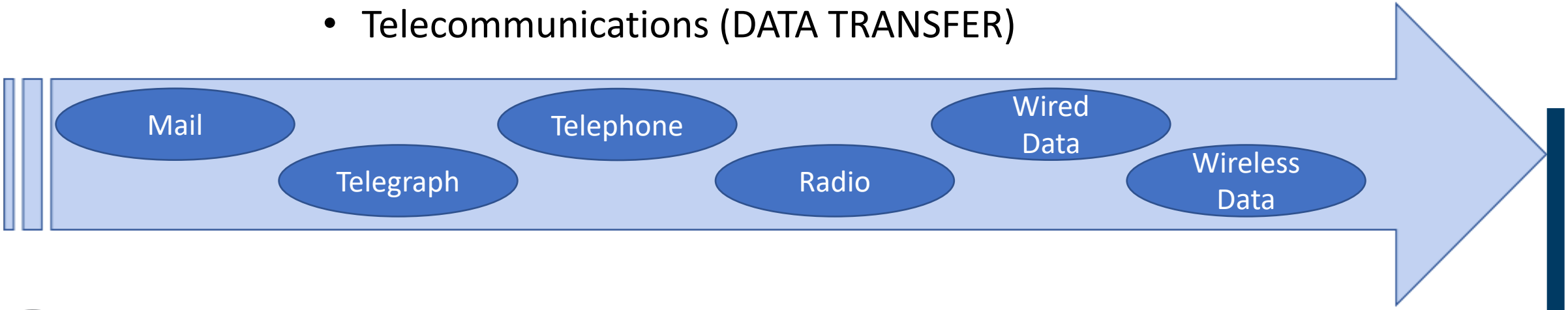
- ED2 Corp is a homegrown Tucson company; designs and develops RF solutions for commercial and defense sectors



Making 5G Happen™

Essential Infrastructure Enables Our Way of Life

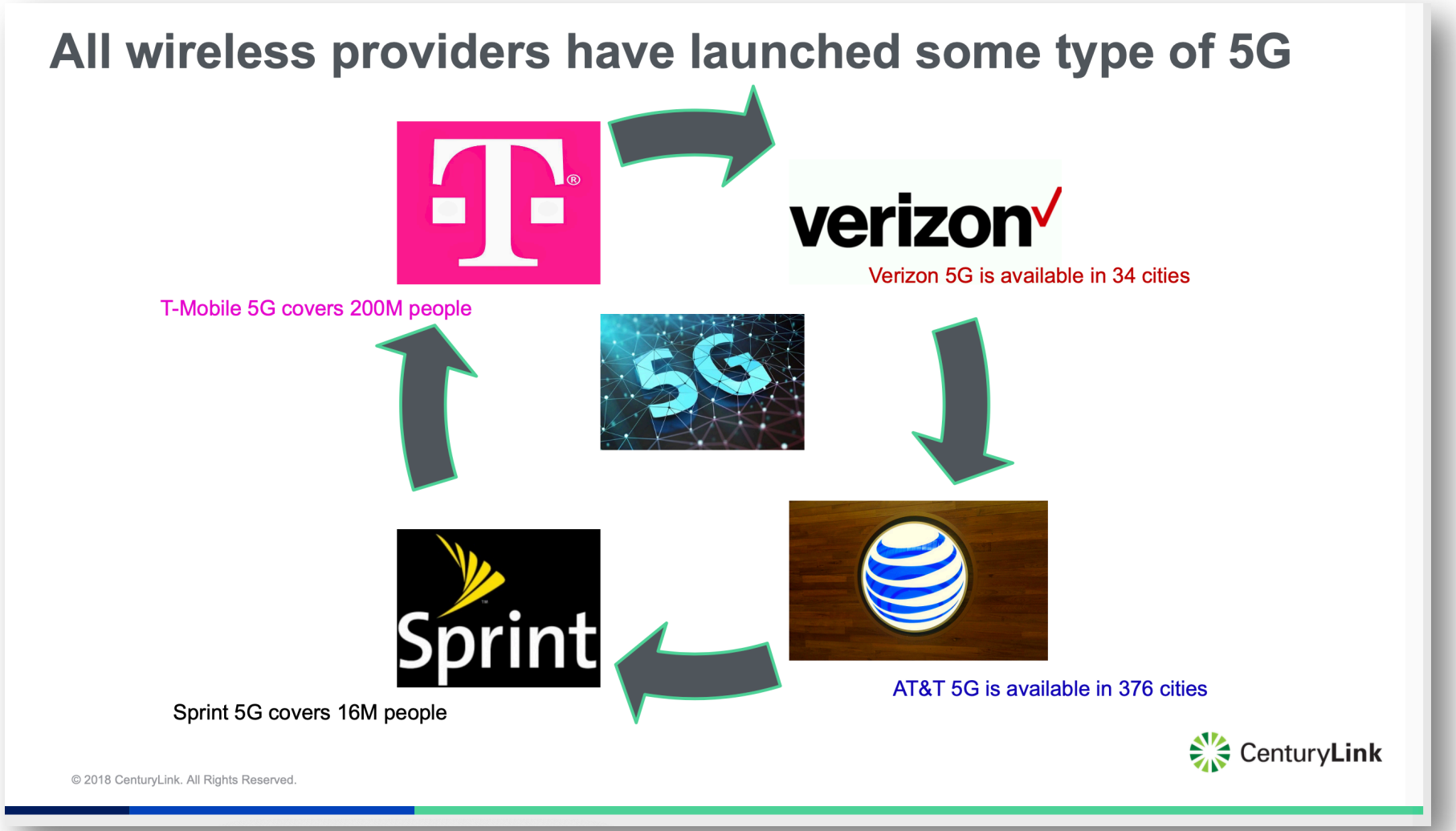
- Transportation
  - Roadways
  - Maritime
  - Rail
  - Air
- Water and Sewer
- Energy
  - Gas
  - Electricity
- Telecommunications (DATA TRANSFER)



Telecommunications as Essential Infrastructure

What is 5G?

5G is the next (5th) generation of communication networks



What is 5G?

5G is the next (5^{th}) generation of communication networks

1G → 2G → 3G → 4G → 5G

	1G	2G	3G	4G	5G
Time	70's – 80's	90's – 04	04- 10	10's - Now	future
Data	2kbps	64kbps	2Mbps	100Mbps +	10Gpbs-100Gpbs
Technology	Analog	Digital	CDMA/EDGE	Wi-Fi/LTE	New WWWW

Lots of Data

Why 5G?

5G is the next (5^{th}) generation of communication networks

Legacy systems have insufficient capacity to support the 5G ‘promise’ which translates to improved quality of life and improved business efficiency

- Smart Agriculture and Rural Connectivity
- Smart Transportation
- Smart Cities
- Telemedicine
- Education
- Smart Infrastructure

What is 5G?

5G is the next (5^{th}) generation of communication networks

Phase 1 Upgrade of 4G technology - incremental innovation

- Will stay at frequencies < 6 GHz
- Modification of current RF packaging architectures
- Minimal change

Phase 2 5G mmWave technology - **disruptive innovation**

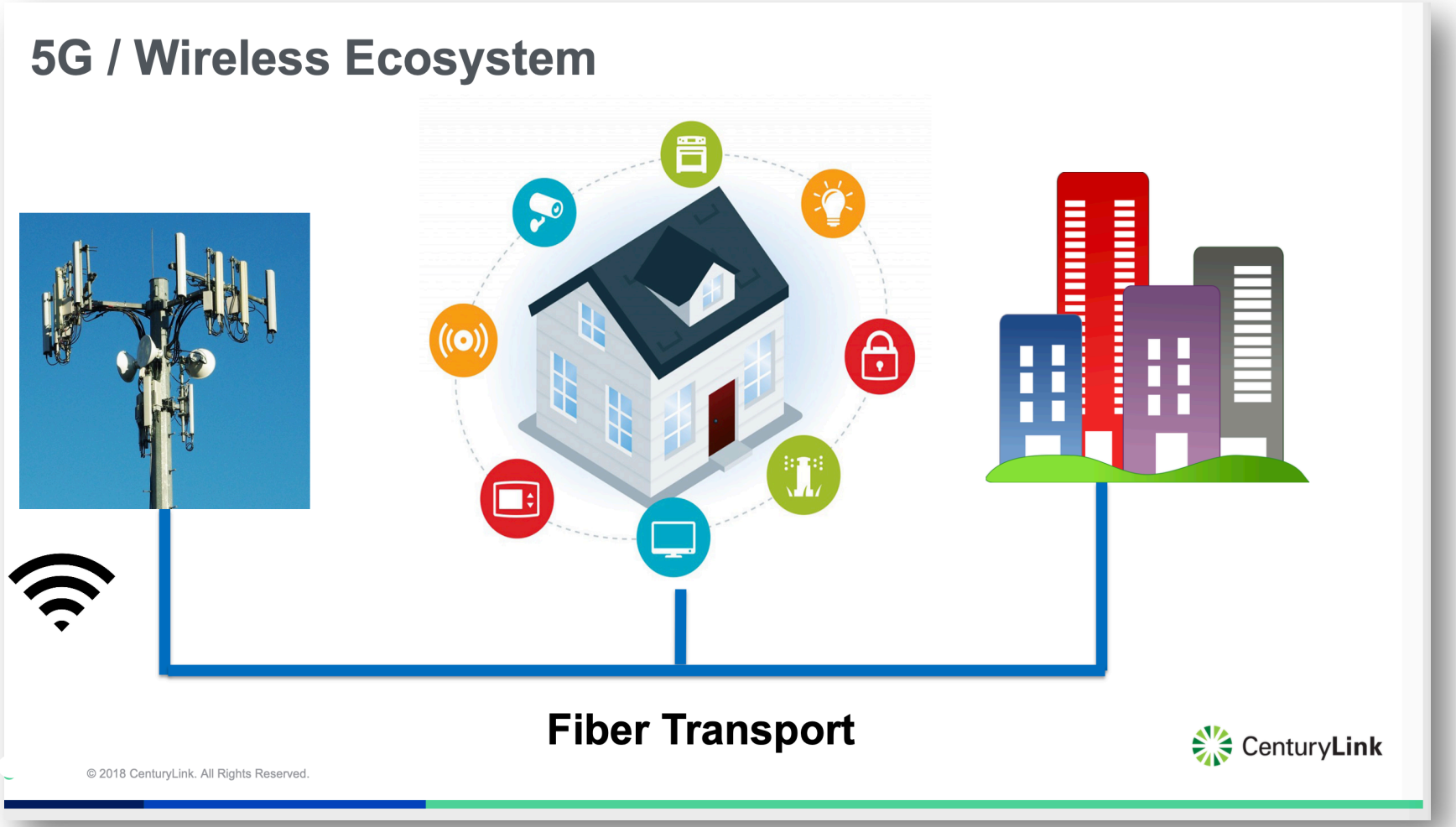
- Introduction of mmWave frequencies >24 GHz
- Adoption off new packaging architectures and platforms
- Extensive design changes and new materials required

You need a new Phone

What does 5G offer?

- Much faster and wider bandwidth
- Reduced latency (time of response)
- High data rates
- High system capacity
- Massive device connectivity

How does it work?



How does it work?

- 5G requires small cell concept
- MIMO – (multi input/multi output) technology which uses multiple antennas to simultaneously receive data
- The network will operate at higher frequencies (millimeter wave) where wider lots of band width exists

Think WiFi on Steroids

Where is the industry now?

- Much hype, limited real information
- Mostly sub 6GHz (Phase 1)
- Carriers still trying to make sense of costs of rolling out new infrastructure (small cell) model
  - *Focus is on areas with lots of consumers served by a high-density network (large cities)*
- However, State and Federal funding eligibility requires service to rural areas

User and public expectations vs. slow rollout

Private Networks with Forward Compatibility

- “Fiber over the air”
  - Lower costs, shorter time frame, reduced impact vs. traditional fiber solutions
- Shorter time horizon for broader and faster connectivity vs. commercial telecommunications roll-out model
- Build in compatibility for subsequent commercial roll out (mid-term)
- Financing for capital and operating expenses - critical urban infrastructure
  - Similar to private water companies
  - Think outside the box for funding mechanisms and sources
    - Co-ops
    - Private infrastructure investment funds
    - Independent taxing districts

Passive vs. Proactive

Thank You

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