Creating Infinite Possibilities.

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The Coming Convergence of Broadband, Energy, and Transportation

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The Coming Convergence

The convergence of will occur in three contexts:

1. At the home
2. In urban and suburban areas
3. In rural areas

While different, these contexts will share many attributes and design principles

Cross industry collaboration will be necessary to achieve this convergence

Key Drivers

- The electrification of vehicles and the EV charging infrastructure
- The evolution of autonomous vehicles with the transformation of public transit and shipping
- The shift from centralized to distributed power sources (solar, wind, battery)
- The need to address cyber threats to critical infrastructure
- Increasing demand for ubiquitous broadband connectivity and addressing the digital divide
- Shift from natural gas to electric for heat, hot water and cooking
- The evolving EV charging requirements for connectivity to support “reservations and payments”
- The Transactive Energy Ecosystem that is tightly coupled to a modernized grid and EV needs
- Grid Modernization, the digital transformation to enabling the bi-directional flow of electrons
- Substantial investment resulting from the Infrastructure Investment and Jobs Act (IIJA)

The Point of Convergence

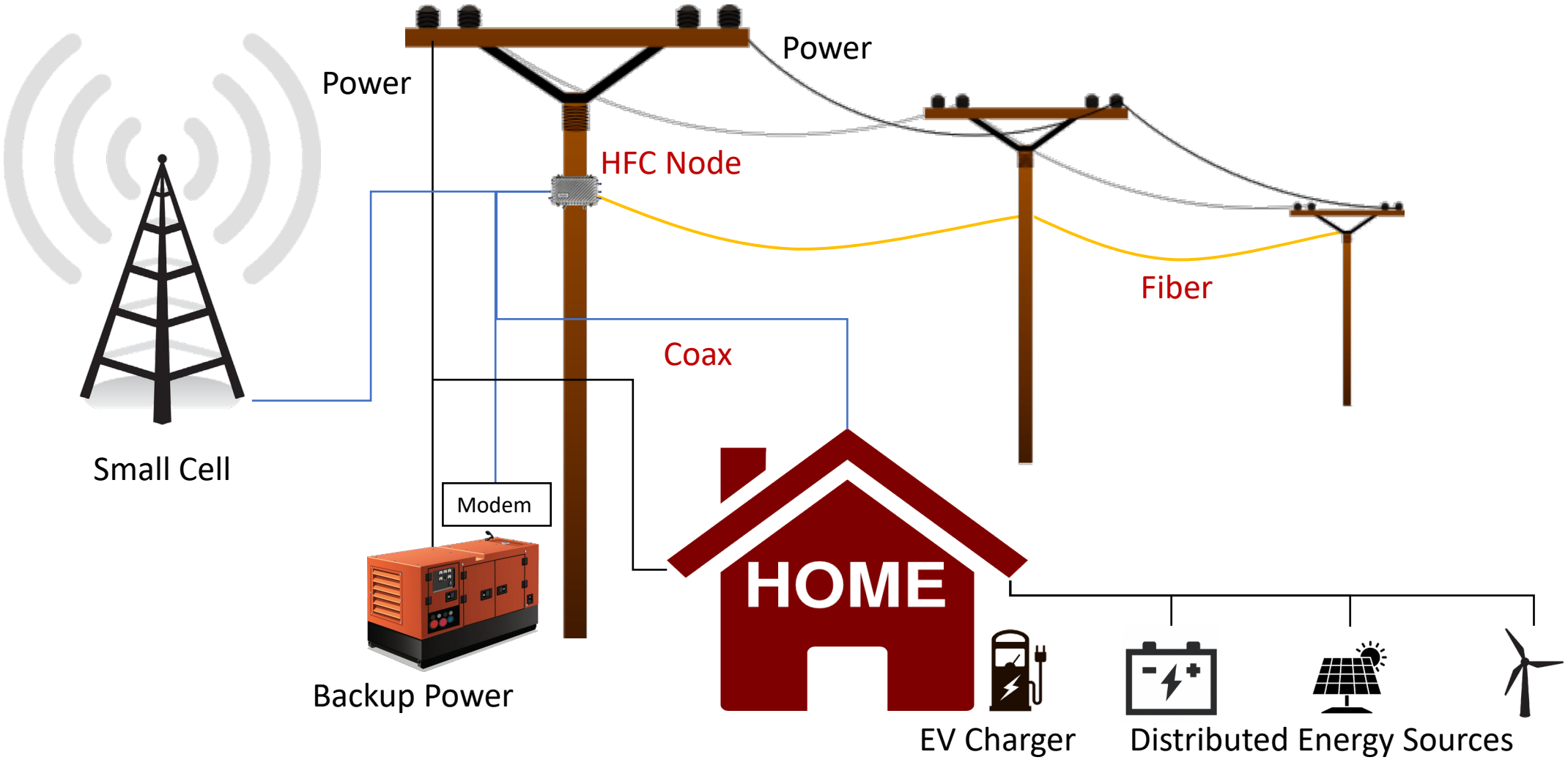
Management of the power grid will require data and connectivity (there is an increase in the need for broadband for management of distributed energy sources)

Last mile of power grid may need to be ”actuated”

The power grid and the broadband network can come together at those points where a network connection is made that draws power, e.g.:

- At the home
- At a commercial EV charging station
- Along roads and highways for Vehicle to Infrastructure broadband

Convergence at the Home



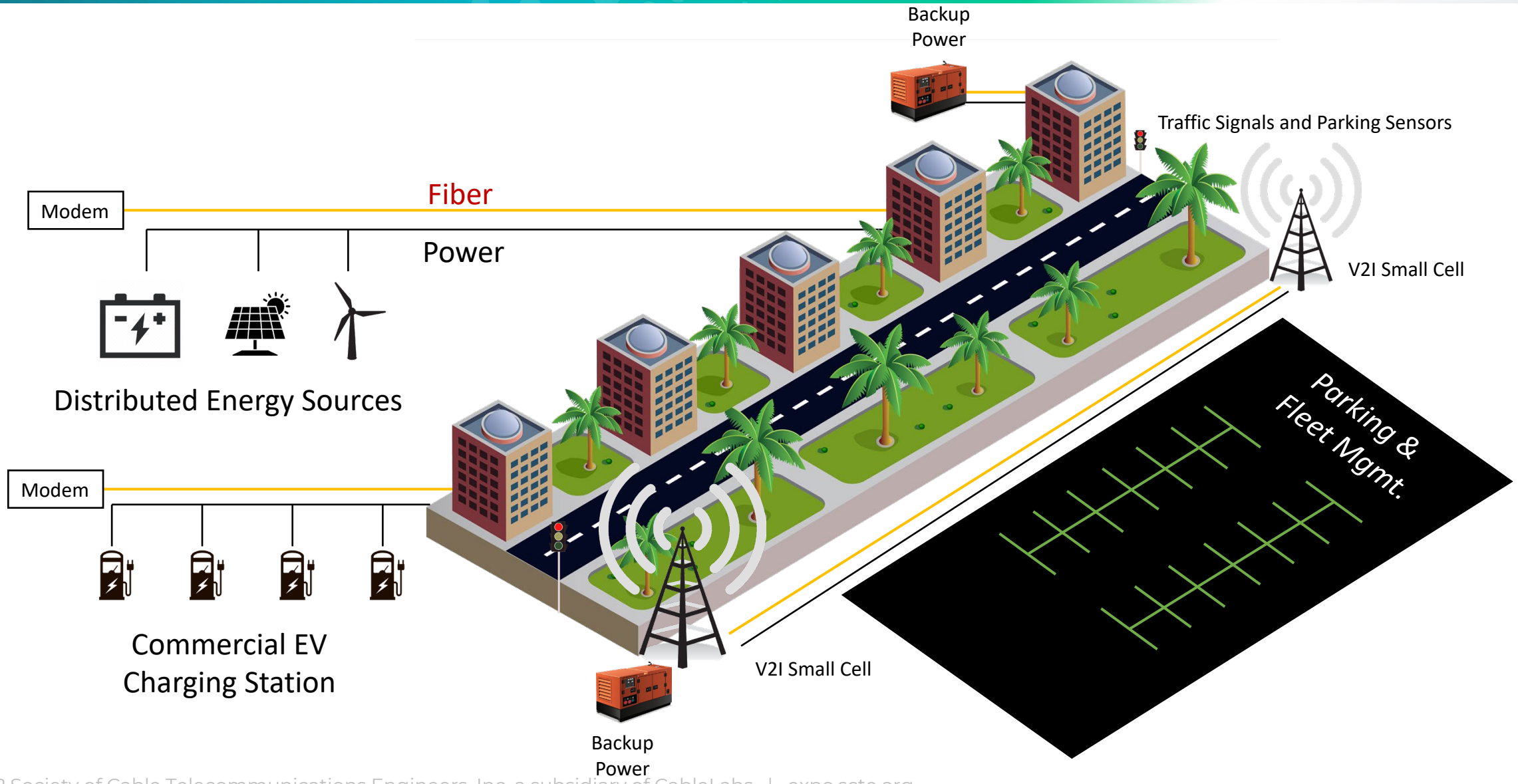
Convergence at the Home

Vehicle charging and distributed energy sources at home enables

- Grid monitoring at the home
- Grid management for home-based energy sources (solar, battery, EV, etc.)
- Automated Demand Response (ADR) for the home
- Secure broadband services for both consumer, grid monitoring/management, and autonomous EV connectivity (stationary)
- Consumer & commercial visibility into energy consumption & contribution
- Two-way power transactions between grid and EVs

Construction synergies (dig once) for resiliency

Convergence in Urban Areas



Convergence in Urban Areas (1 of 2)

Vehicle to Infrastructure (V2I) communication enables:

- Addressing traffic safety, congestion issues, and traffic signal management
- Parking and fleet management
- Transformation of public transit
- Transformation of package delivery
- Broadband connectivity to autonomous vehicles (in motion)
- Grid monitoring - transportation Vehicle to infrastructure (V2I) small cell location

Urban EV charging infrastructure enables:

- Grid monitoring at the charging station
- Security monitoring at the charging station (safety concern)
- Secure broadband services for autonomous EV connectivity (stationary)
- Two-way power transactions between grid and EVs

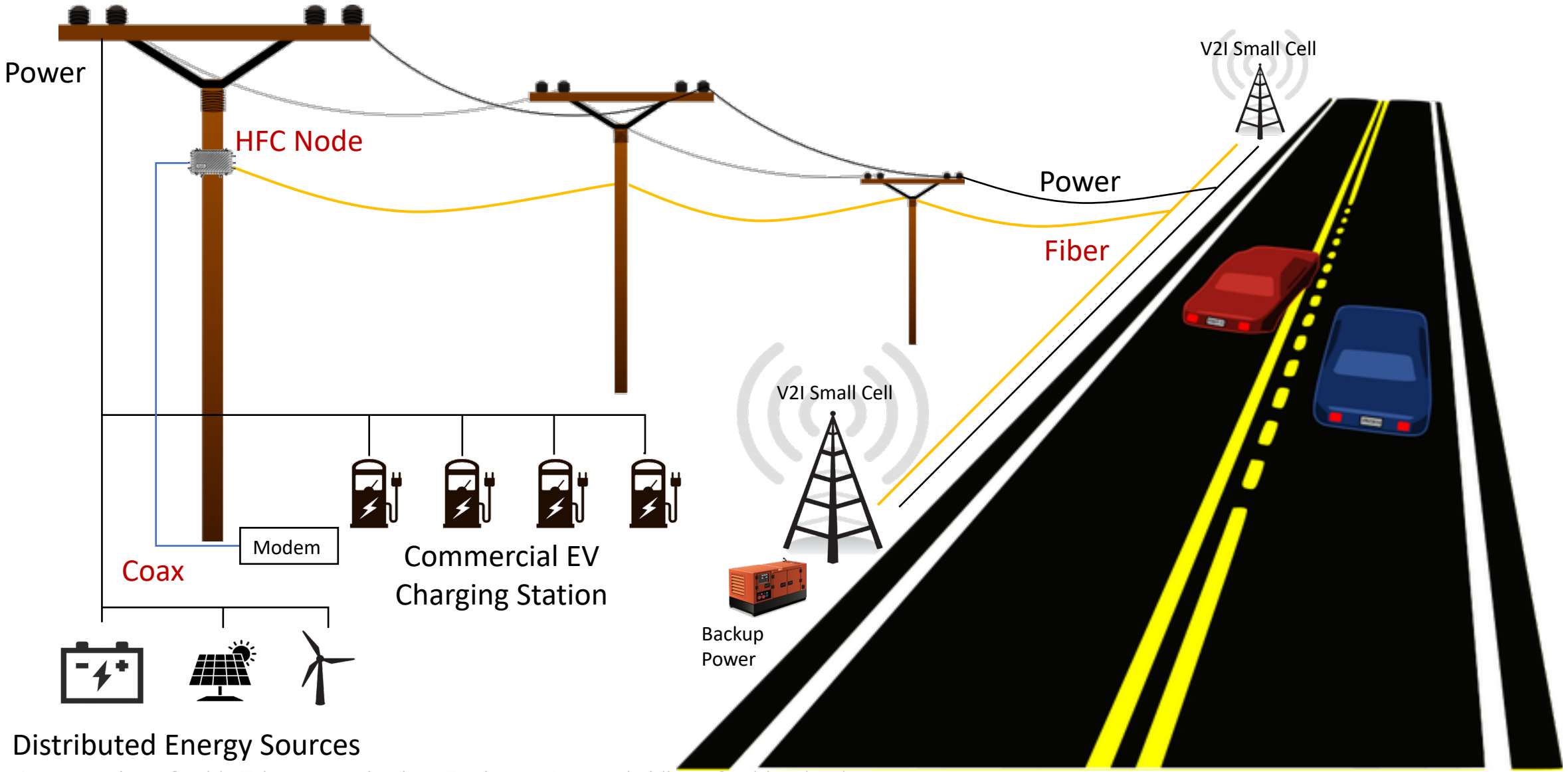
Convergence in Urban Areas (2 of 2)

Vehicle charging and distributed energy sources at the building or MDU enables

- Grid monitoring at the commercial building or MDU
- Grid management for commercial building or MDU (solar, battery, EV, etc.)
- Automated Demand Response (ADR) for the commercial building or MDU enables
- Secure broadband services for commercial building or MDU
- Secure broadband services for grid monitoring/management and autonomous EV connectivity (stationary)
- Commercial visibility into energy consumption & contribution

Construction synergies (dig once) for resiliency

Convergence in Rural Areas



Convergence in Rural Areas

Vehicle to Infrastructure (V2I) communication enables:

- Addressing traffic safety and congestion issues
- Transformation of long-distance public transit
- Transformation of long-haul shipping
- Broadband connectivity to autonomous vehicles (in motion)
- Grid monitoring at the transportation V2I small cell location
- Middle mile broadband connectivity for rural communities

Rural EV charging infrastructure enables:

- Grid monitoring at the charging station
- Security monitoring at the charging station (safety concern)
- Secure broadband services for autonomous EV connectivity (stationary)
- Two-way power transactions between grid and EVs

Construction synergies (dig once) for resiliency

Conclusions

We are at a unique point in time to maximize the impact of investment into smart infrastructure across three major industries

This impact can only be fully realized through cross-industry collaboration

While we do not minimize the challenges of this kind of cross-industry collaboration, we do know that collaboration cannot occur unless the lines of communication are opened, both literally and figuratively

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Thank You!

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