



# *Wireless Communications for the Smart Grid*

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**Global energy supply gap**

**Aging architecture**

**Aging workforce**

**Regulatory compliance and penalties**

**Movement to Alternative Energy Resources,  
Distributed Energy Resources and Plug-in Electric  
Hybrid Vehicles (PHEV)**

**Pressure from investors to improve ROI**

**Physical and cyber-security concerns**

**Public policy changes**



# Smart Grid Trends & Drivers

**Smart Grid automation is M2M data communications-centric**

**It includes technologies that use secure communications to:**

- Enable utilities to monitor & control the electric grid
- Provide improved customer service
- Improve worker productivity
- Promote alternative energy resources
- Make more efficient use of the electric grid and generation resources

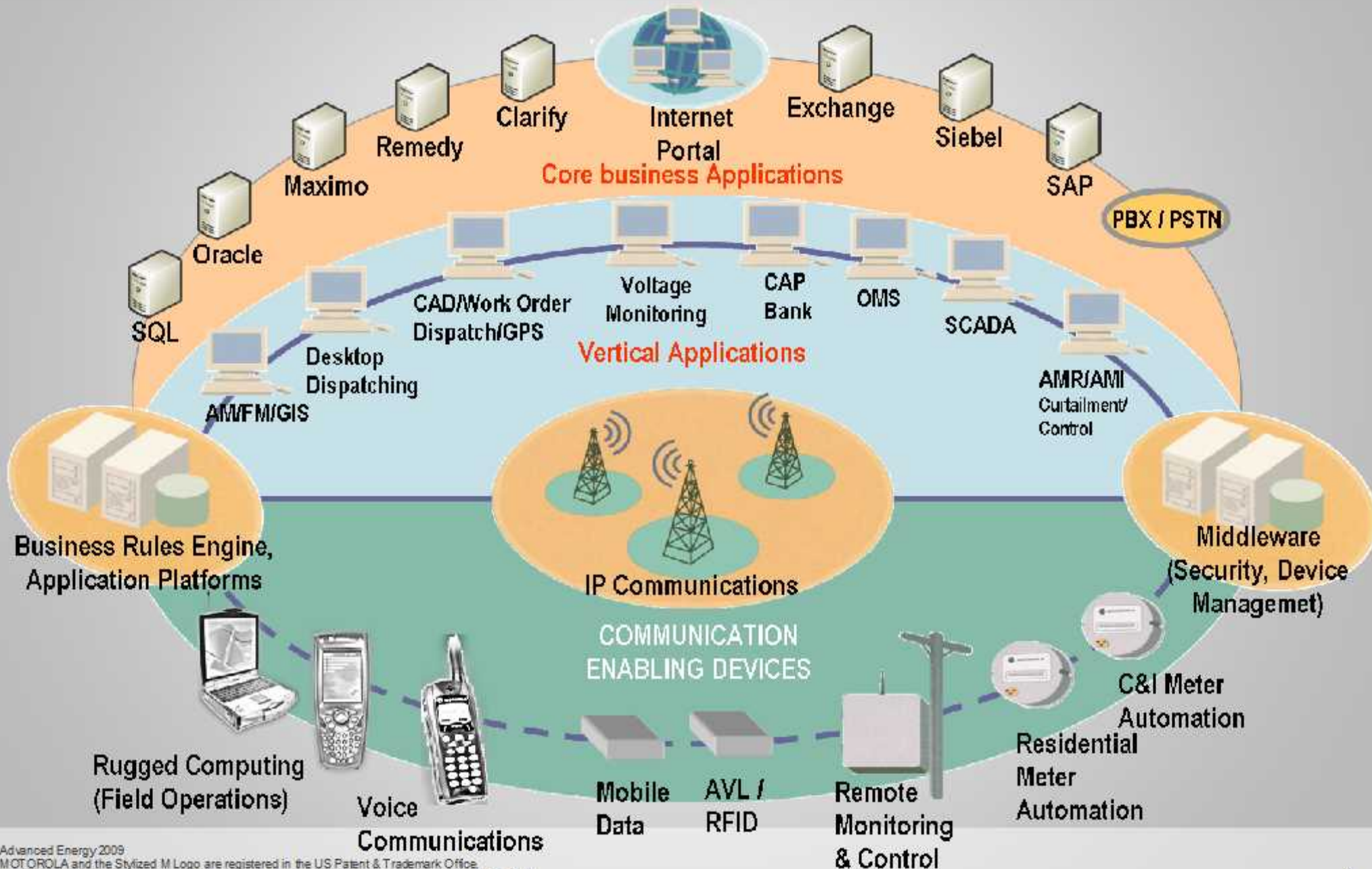
**Smart Grid application timing, coverage, latency, bandwidth, security and business case requirements are varied**

- This often results in data application silos ... the *“Un-Connected Utility”*

**Secure wireless communications will play an important role in the Smart Grid**



# A "Connected Utility"





# There Are Many Network Options

= Private   
  = Existing Resource  
 = Public  
 = Future    MC = Mission Critical

DATA VOICE

	Utility	Generation	Transmission	Substation	Distribution	Customer	Brand Office / Warehouse	Vehicle	Employee	
WAN	Private, Licensed, MC						Private, Licensed, MC			
	Public / Non-MC			Public / Non-MC			Public / Non-MC			
	WiFi			WiFi			WiFi			
WAN	Existing Fiber									
	Public Cellular Data					Public Cellular Data				
	Private, Licensed, MC					Private, Licensed, MC				
				BPL						
MAN	WiMAX / LTE									
			Fixed Licensed Broadband – MC					Fixed Broadband		
			Fixed Unlicensed Broadband – Non-MC							
					Mesh					
				Metropolitan Meshed WiFi						
LAN	WiFi			WiFi			WiFi			
					Mesh					
						HomePlug				
PAN	Bluetooth					Bluetooth				
				Zigbee						
	Near Field (NFC)			Near Field			Near Field		Near Field	
	RFID						RFID			



# *Consider The Five C's When Choosing Networks*

## **C**ontrol

The ability to control your network – particularly in the event of disasters

## **C**overage

Covering your entire service territory – even very remote areas

## **C**apacity

Ensuring enough data capacity – for today's applications and future applications

## **C**apabilities

Robust, secure, and proven capabilities for current and future requirements

## **C**ost

A cost-effective solution that meets your business case



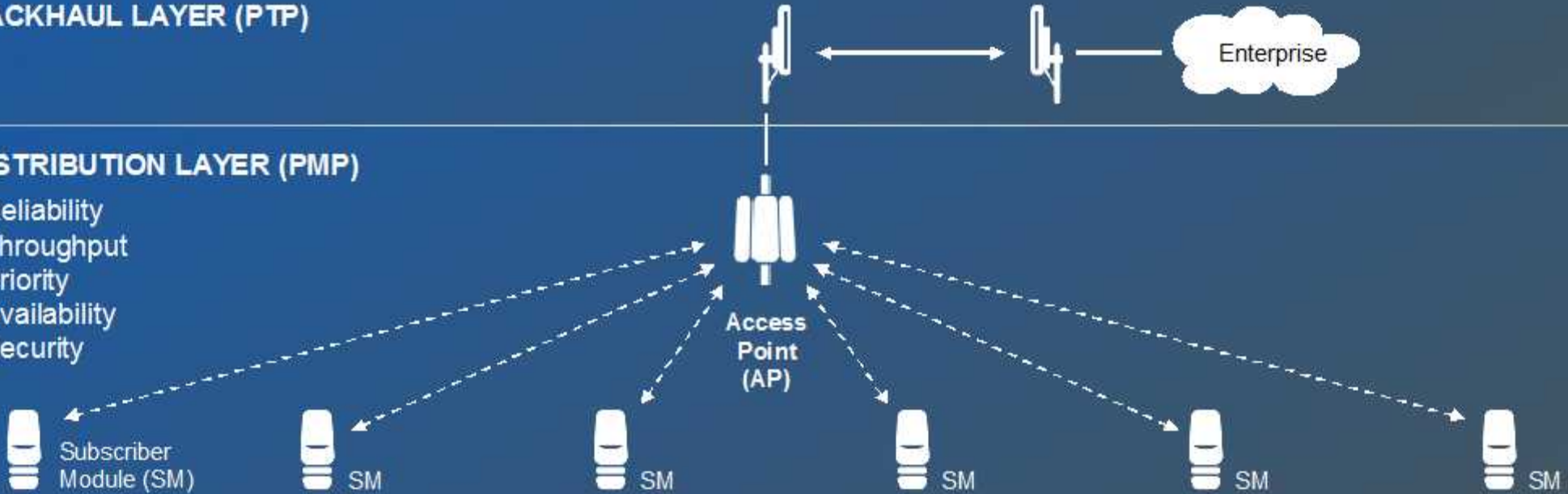
# Leveraging Private Backhaul Applications

## BACKHAUL LAYER (PTP)



## DISTRIBUTION LAYER (PMP)

- Reliability
- Throughput
- Priority
- Availability
- Security



## APPLICATION AND ACCESS LAYER



Generation



Transmission



Sub-Station



Distribution Network  
Distributed Generation



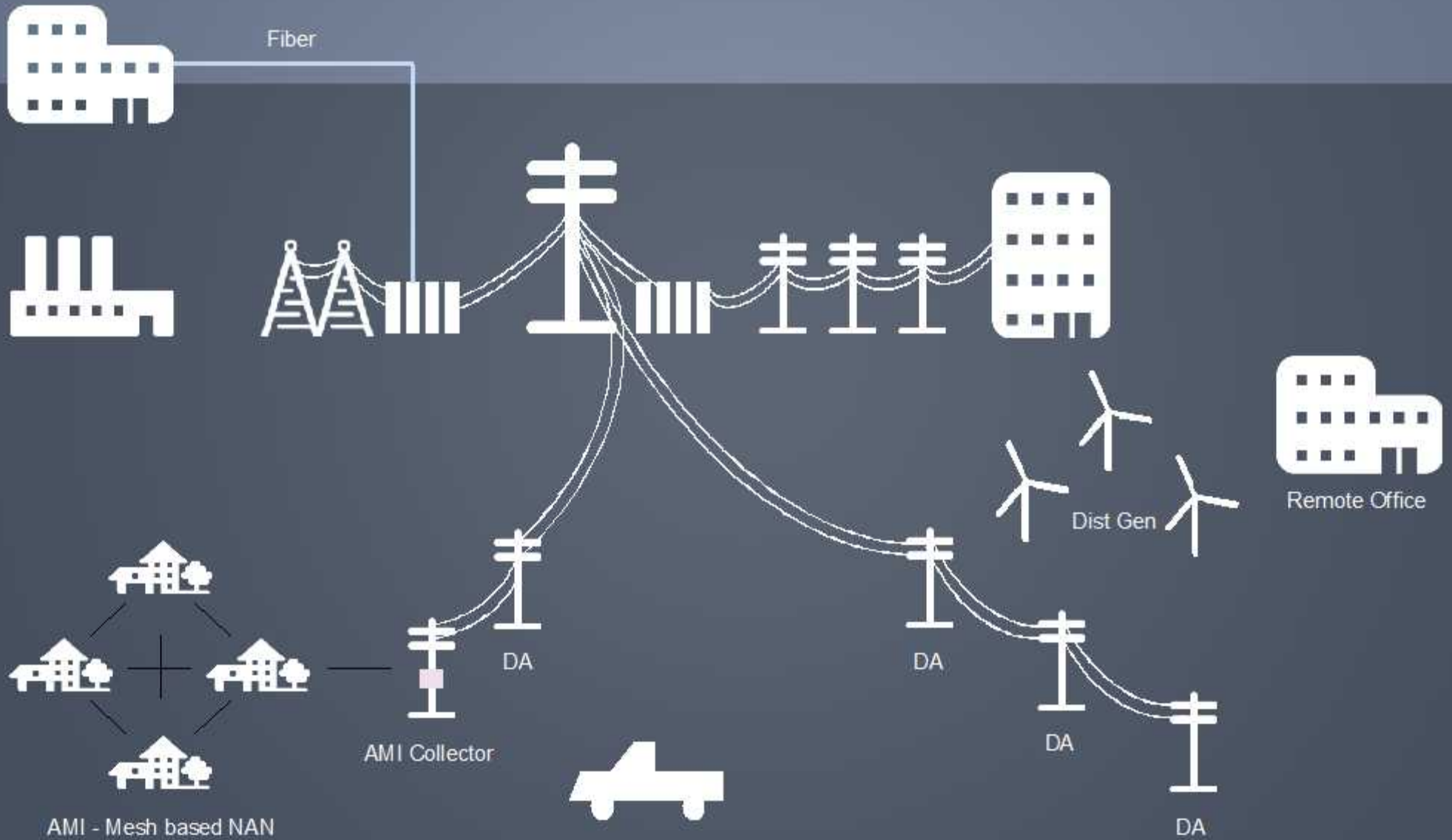
Urban, Suburban and  
Rural Customers



Branch Office



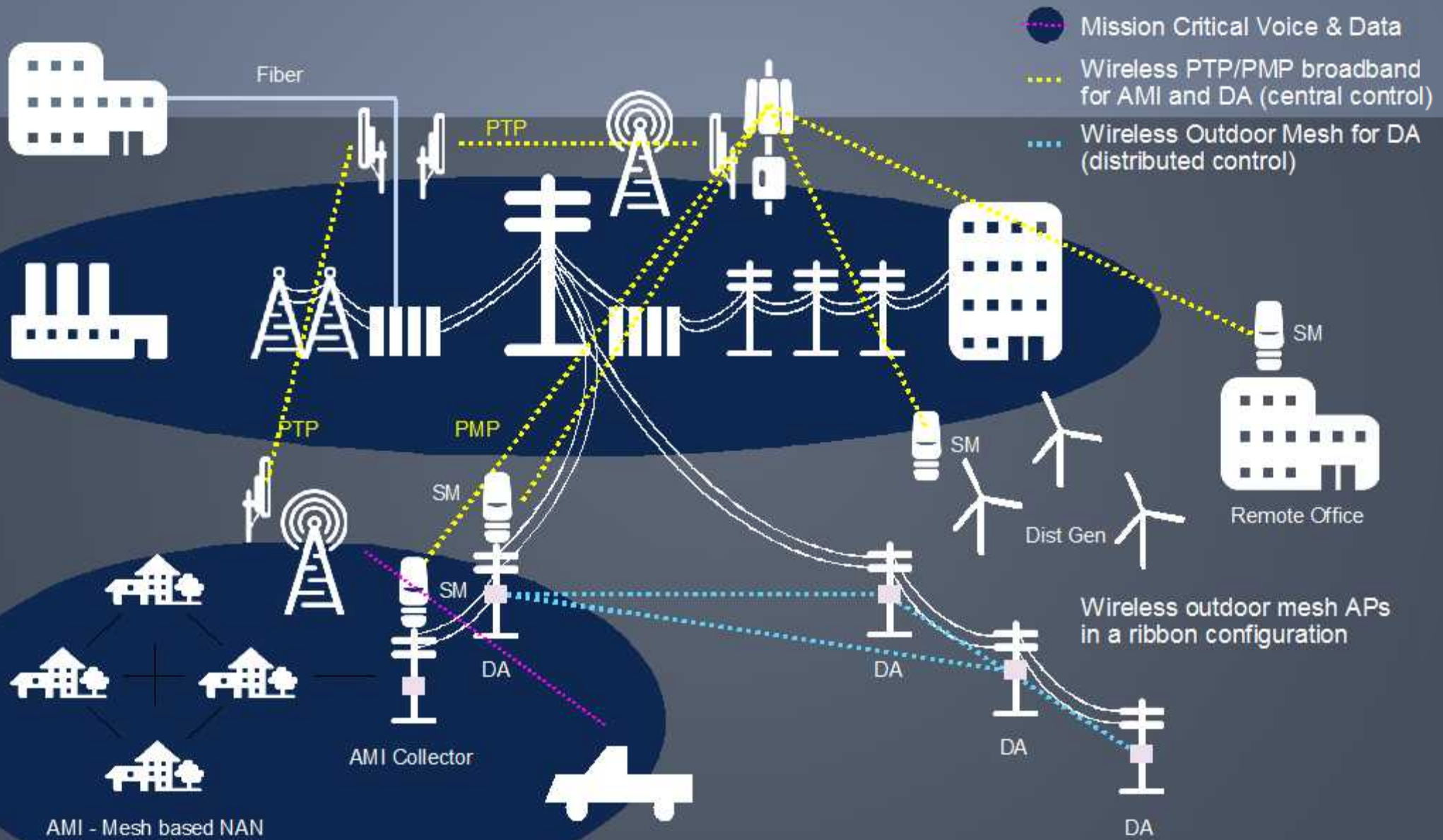
# Architecting The Network







# Architecting The Network





## *Spectrum for the Smart Grid*

### Unlicensed Spectrum used today in the Smart Grid

- 900 MHz, 2.4 GHz
- Interference is inevitable
- Security and reliability of unlicensed spectrum is difficult
- Coverage is limited by the unlicensed band power limits

Licensed spectrum and private networks afford more flexibility in coverage, security and deployment

Data bandwidth use always exceeds early projections

More than one wireless network will be used in the Smart Grid

Achieving the entire Smart Grid vision will require access to licensed spectrum

# Thank You!



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**Learn more at:**  
[www.motorola.com/connectedutility1](http://www.motorola.com/connectedutility1)