

# Hawaiian Electric Companies Modern Grid Technology and Leading Practices Workshop

May 10, 2017



# Silver Spring's Platform Aligns with the Grid Mod Objectives and PUC Guidance



Proven multi-application platform with >26M devices operating worldwide.



5<sup>th</sup> generation IoT platform delivers unparalleled coverage, speed and security



Leverages widely adopted open standards IPv6, 802.15.4 (ZigBee & Wi-SUN)



Future-proof technology provides full backward and forward compatibility.



Full project lifecycle support to accelerate and maximize results and benefits





# Customers, Society and Utilities Benefit



## CUSTOMERS

- Reduced energy costs and bill impact
- Increased customer satisfaction & empowerment
- Improved reliability



## SOCIETAL

- Reduced environmental impact
- Increased economic output
- Increased fairness
- Improved quality of service







## UTILITY

- Increased safety for utility workers and customers
- Enhanced visibility into grid conditions
- Improved integration of new generation sources
- More effective rate design
- Reduced planning efforts

# Don't Take Our Word for It

## Customer Results Speak for themselves

<p><b>LOWER ELECTRICITY BILLS</b></p>  <ul style="list-style-type: none"> <li>• \$100M returned to customers annually</li> </ul> <p><b>AVOIDED POWER OUTAGES</b></p> <ul style="list-style-type: none"> <li>• 9% reduction in outage frequency</li> <li>• 6.2M customer interruptions avoided since 2012</li> </ul>	<p><b>FLEXIBILITY FOR CUSTOMERS</b></p>  <ul style="list-style-type: none"> <li>• 20% reduction in disconnects</li> <li>• Option to pay prior to disconnection</li> <li>• Same day re-connection</li> </ul>
<p><b>ENABLING DERs</b></p>  <ul style="list-style-type: none"> <li>• 87% reduction in connection costs</li> <li>• Increased acceptance rate by 17%</li> <li>• Shortened approval time by 27 weeks</li> </ul>	<p><b>SAVINGS VIA DEMAND RESPONSE</b></p>  <ul style="list-style-type: none"> <li>• 155MW reduction in peak demand</li> <li>• Annual Customer Savings:             <ul style="list-style-type: none"> <li>• \$152 per residential customer</li> <li>• \$305 per commercial customer</li> </ul> </li> </ul>

# Energy Awareness = Energy Savings

## Meta Study: Energy Conservation (Efficiency) from Feedback

Average Household Electricity Savings by Feedback Type  
 % reduction from average electricity use; 36 pilots represented



**Customer specific info and recommendations drive more energy efficiency**



**ENERGISAVVY**



**GRIDIUM**



**BIDGELY**



**EXCELERON**

Source: American Council for an Energy-Efficient Economy – “Advanced Metering Initiatives and Residential Feedback Programs”

# The Network Decision is Critical

## Key Criteria in Selecting a Platform That Will Not Leave You Stranded

### 1. Ubiquitous Coverage

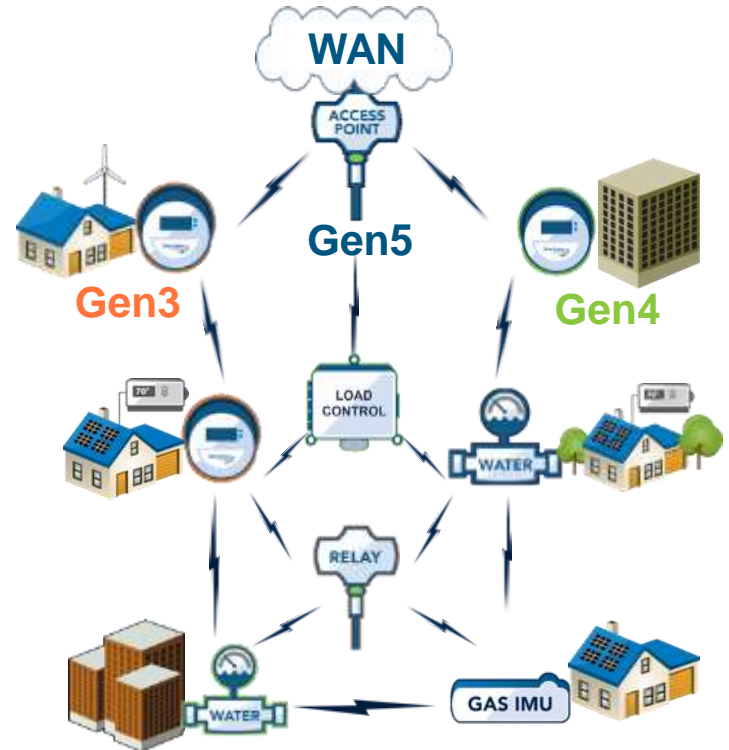
- Architecture matters: robust mesh always superior to point-to-point
- All meshes are not created equal – choose the best of breed

### 2. 100% Backwards and Forwards Compatible

- Technology will advance – will your be left behind, or will it seamlessly interoperate with newer releases from your vendor?
- Demand that you will never be forced to rip and replace

### 3. Connect Anything: No / Minimal Additional Cost

- Your needs will evolve. Will your network platform be an enabler, or a roadblock? Look for the proven ecosystem.
- Choose a network that won't charge you a tax every time you want to use more of the network.



# This is Our Core Business

Source end-point devices as a commodity / Partner with the leader focused on Utilities for the Network and Future IoT Applications

	CORE BUSINESS	WHAT THEY WILL ALWAYS PRIORITIZE	WHAT THEY WILL BE LEAST INTERESTED IN DOING
SILVER SPRING	Networking platform for critical infrastructure.	Strategic Partnership with Ability to harness power of the platform for as many apps as possible to maximize business value from the investment.	We are a networking Company. We do not want to be in the device business
CELLULAR	Selling data plans and signing up more subscribers.	Improving Average Revenue Per Subscriber & delivering acceptable consumer experience.	Industrial customers will always come second
METER VENDORS	Meters.	Maximizing meter volume to keep manufacturing plants busy. Plant utilization drives their margin model.	Sharing meter volume with another player, and competition that drives prices lower.
ENTERPRISE ROUTERS	Enterprise routers sold through indirect reselling partners.	Enterprise features and channel partner as your contact point. Indirect sales is key to their selling/margin model.	Forming a direct relationship with utilities to create specific features for the energy network market.



# Our Commitment:

## Deliver an End-to-End Solution that Stands Up and Stays Up



### Streamline Deployment

- Rely upon a proven, pre-integrated, verified, secure, end-to-end solution
- Execute on schedule and on budget



### Connect Everyone and Everything

- Penetrate remote and hard-to-reach locations with adaptive meshing
- Reach far and wide with a range of up to 50 miles.



### Ensure ROI That Delivers

- Deploy multiple applications on an common platform
- Maintain > 99.9% availability



# ONE PLATFORM

PROVEN. CHOSEN. WORLDWIDE.



**HIGH  
PERFORMANCE**



**RESILIENT AND  
SECURE**



**COST  
EFFECTIVE**



**FLEXIBLE AND  
EXTENSIBLE**



**DURABLE**

# Appendix

## Various Materials and Support

# Our Global Footprint



EXTEND COVERAGE WITH  
PROVEN VERTICALLY  
INTEGRATED  
SOLUTIONS



TAP INTO GLOBAL  
MARKETS FOR THE  
INTERNET OF  
IMPORTANT THINGS



DIFFERENTIATE YOUR  
BUSINESS TO DRIVE  
GROWTH AND  
PROFITABILITY

25.5 MILLION ACTIVE IoT DEVICES  
COVERING ~60M PEOPLE

99.9% UPTIME

700M DAILY RECORDS,  
OR 255B PER YR

4.5B DAILY BYTES

ACROSS  
1.5M  
SQ MILES ON  
5 CONTINENTS





# Expanding Global Leadership in 2016 and Beyond



Our continued innovation drives our global success

## AWARDS



## CUSTOMER WINS



City of Westminster



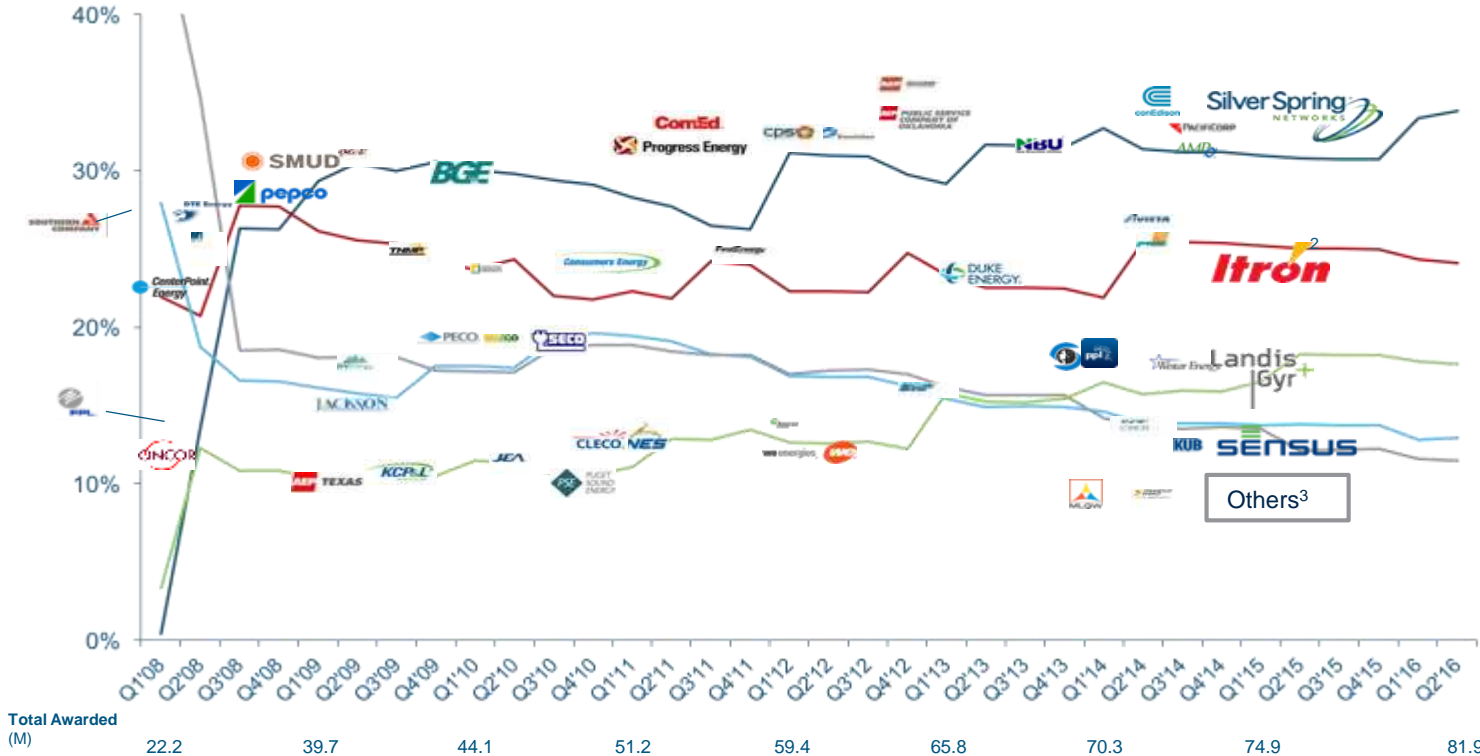
CITY OF PROVIDENCE  
João G. Braga, Mayor





# The Market Leader in Smart Grid Networking

Silver Spring is the leading provider of AMI and distribution automation networks



Note: The recent addition of Entergy increases SSNI's market share by ~3%

Total Awarded (M): 22.2, 39.7, 44.1, 51.2, 59.4, 65.8, 70.3, 74.9, 81.9

1. Based on pilot, scale, and full deployment data from the four vendors depicted above plus data from Elster, Aclara, Tantalus, Trilliant, Cooper, and Echelon (i.e. Others)  
 2. Itron includes SmartSynch, acquired Feb. 2012; Includes Duke Energy (Indiana, Kentucky, Carolinas West, Ohio - C&I)  
 3. Others includes Tantalus, Aclara, Elster, Trilliant, Intelagrid, Echelon, Cooper, Fujitsu, Mueller

# Standards at Every Level - The Clear Leader



The Deloitte Benchmarking Study emphasized using solutions that incorporate open standards

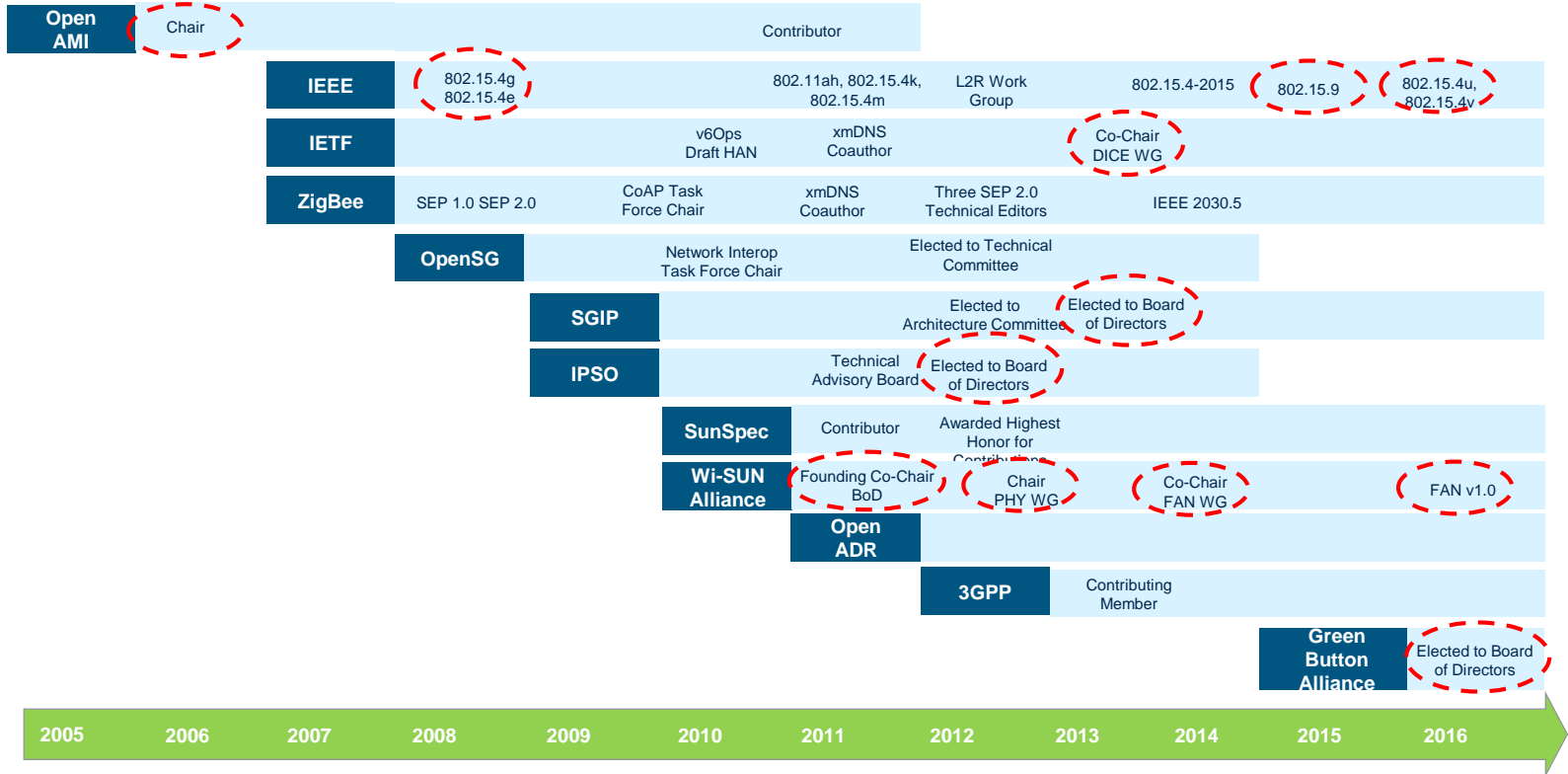
- First to advocate use of IPv6 for smart grid
- First to drive standards for mesh radios
- Early leader in standards for home networks
- Co-founder of interoperability testing forum
- Unparalleled leader in product choice

## Future Standards

- 802.15.4g / Wi-SUN evolution
- CEA-2045 / USNAP
- Leaf-node protocols
- SEP 2.0 / SunSpec
- CoAP (Constrained Application Protocol)
- blockchain / DLT
- Distributed application standards
- Security standards



# Continuous Standards Leadership



# Silver Spring Platform

Standards at Every Level



SEP 1.x	REST Web Services CIM IEC 61968		C12.19/ C12.18	DLMS/ COSEM IEC 62056	PANA RFC 5193	SNMP RFC 1157	NTP RFC 5905	SSH RFC 4251	DNS RFC 1085	DNP3 IEEE 1815	SunSpec
ZigBee Cluster Libraries	EXI	CoAP/ HTTP RFC2616	TLS/ RFC5246 DTLS RFC6347								
ZigBee Pro	TCP RFC 793/UDP RFC 768								RPL RFC 6553	ICMP RFC 4443	MODBUS
	IPsec RFC 2401	IPv6 RFC 2460, IPv6 Addressing 4291 IPv4 RFC 791					DSCP RFC 2474				
	6LoWPAN RFC 4944	PPP RFC 1661									
802.15.4 MACs	IEEE L2R	GPRS	Satellite	4G LTE 3GPP TF25.913 WIMAX - IEEE 802.16	IEEE 802.3	IEEE 802.11					
802.15.4 DSSS	802.15.4 FHSS	2G GPRS	3G								

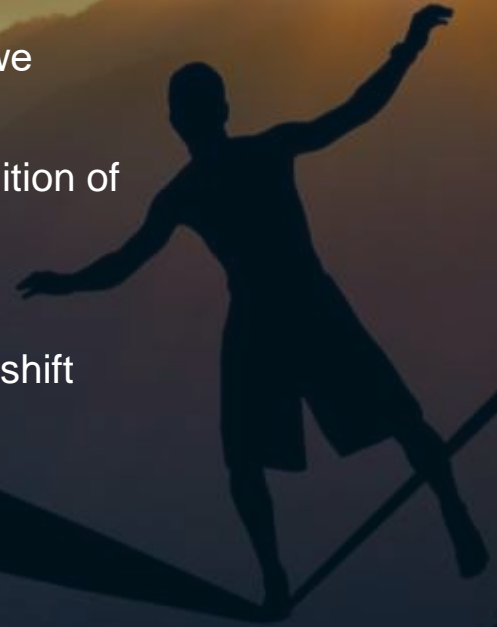




# A Tectonic Shift is Underway

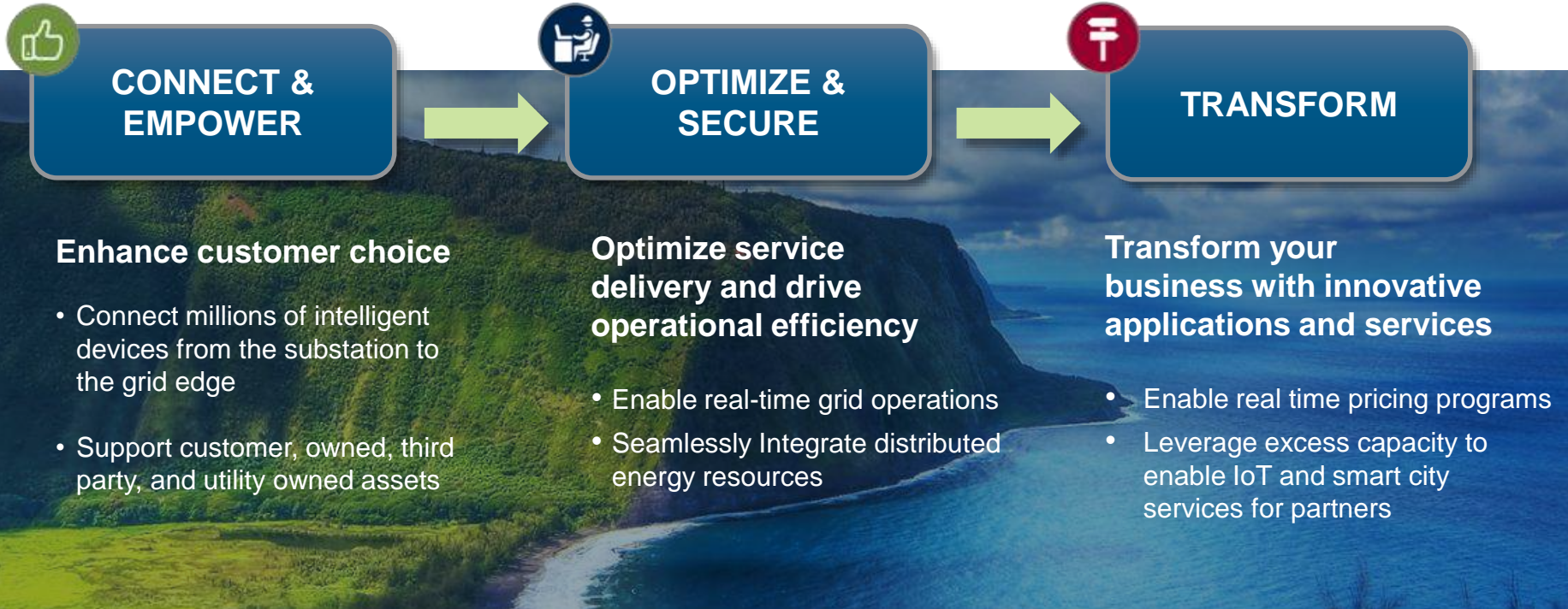
The shift to becoming a distribution system operator will cripple many utilities while enabling others to flourish

- “Decisions made now will have profound implications on what we become in the future”
- The market is rapidly changing, challenging the traditional definition of what a utility is.
- Utilities must become distributed, service oriented businesses.
- The IoT revolution will be the single most important technology shift that will enable utilities to evolve to become distribution system operators.



# The Network is Fundamental to Enabling this Shift

Becoming the distribution system operator requires real time visibility and control





# Our Visions are Aligned



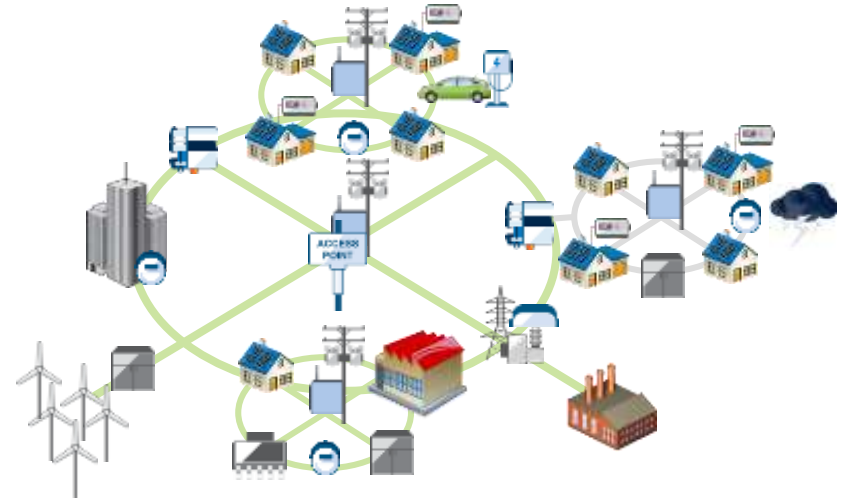
**EMPOWERING  
THE CONNECTED  
CONSUMER**



**DRIVING  
RESILIENCE AND  
RELIABILITY**



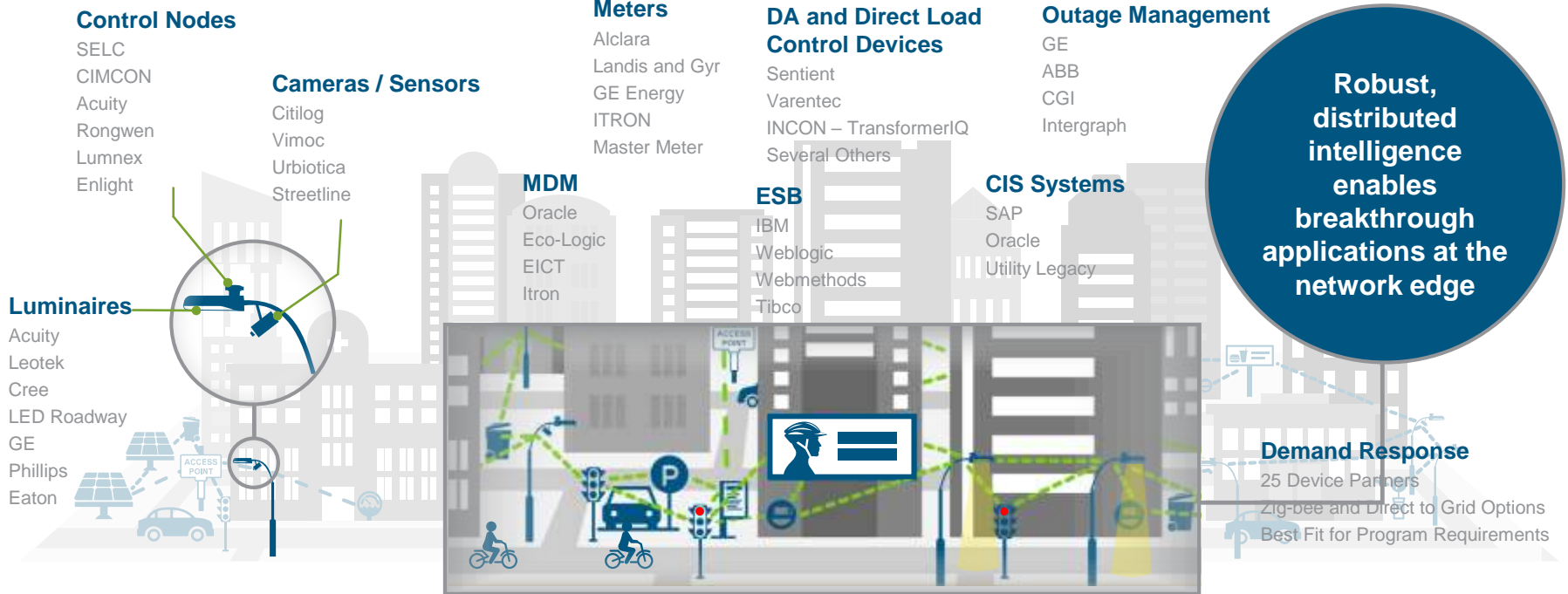
**CATALYZING A  
MARKETPLACE  
FOR DERs**



*The digital grid will unlock business transformation and customer choice*

# Technology Agnostic Platform

Enables seamless connections across devices from an expanding Eco-System of






Representative Examples: The above partner references are not all inclusive



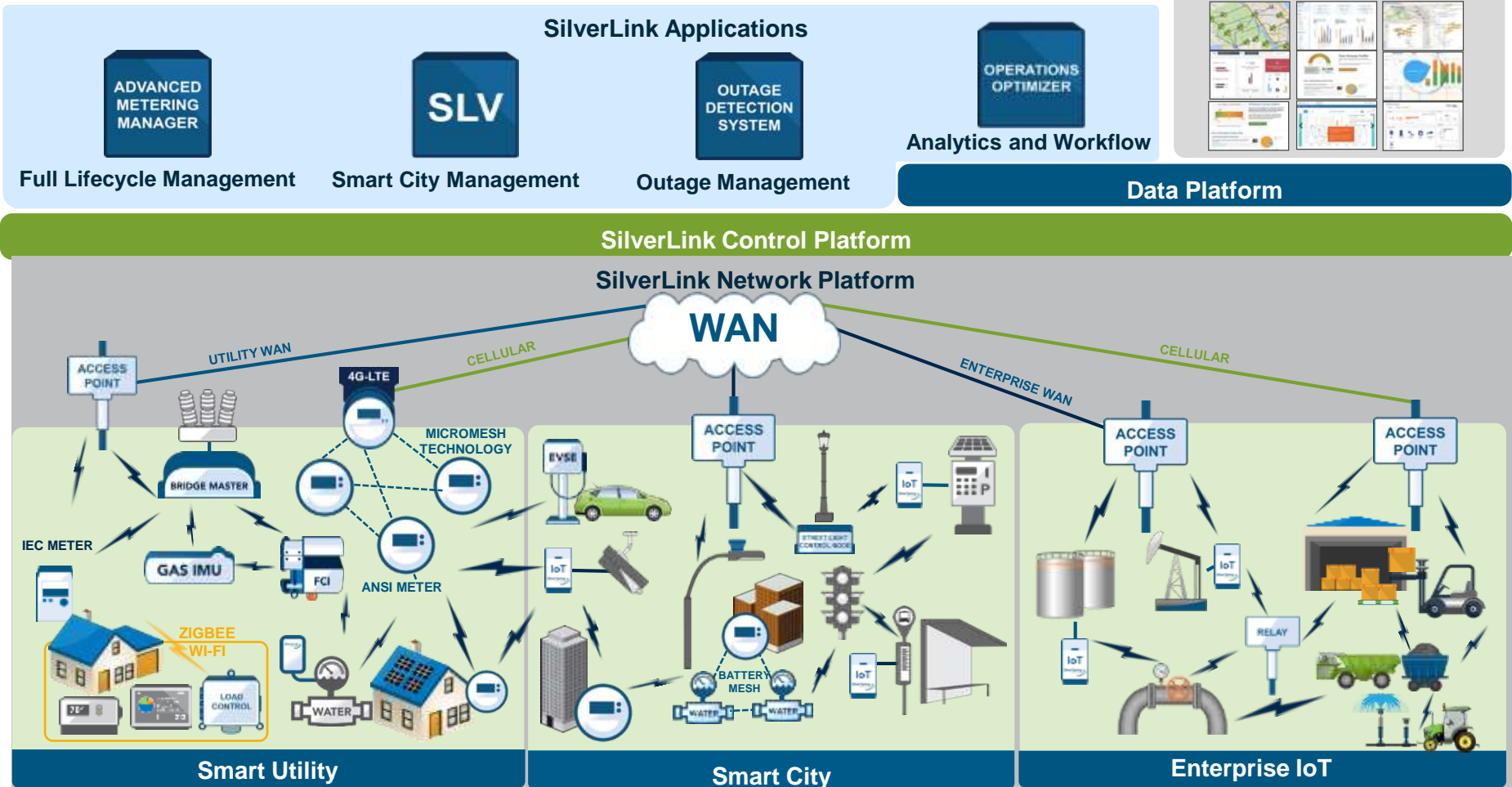
# Breaking the Mold

## Initiatives from a few forward thinking utilities

Client	IoT Endpoints	Applications Supported
ComEd	<ul style="list-style-type: none"> <li>• Electric AMI: 3.9M</li> <li>• Distribution Automation: 5.9K</li> <li>• Pilot: Street Lights, High Frequency Data, Water AMI, Gas AMI</li> </ul>	 <p>Silver Spring IoT Platform</p>
Consolidated Edison	<ul style="list-style-type: none"> <li>• Electric AMI: 3.9M</li> <li>• Gas AMI: 1.3M</li> <li>• Pilot: Distribution Automation Methane Sensors, Carbon Monoxide Sensors, Street Lights, High Frequency Data</li> </ul>	 <p>Silver Spring IoT Platform</p>
Florida Power & Light	<ul style="list-style-type: none"> <li>• Electric AMI: 5.9M</li> <li>• Distribution Automation: 25K</li> <li>• Street Lights: 503k</li> </ul>	 <p>Silver Spring IoT Platform</p>

**Utilities addressing similar challenges have contracted for more than 8 million Gen5 endpoints.**

# How it Works:

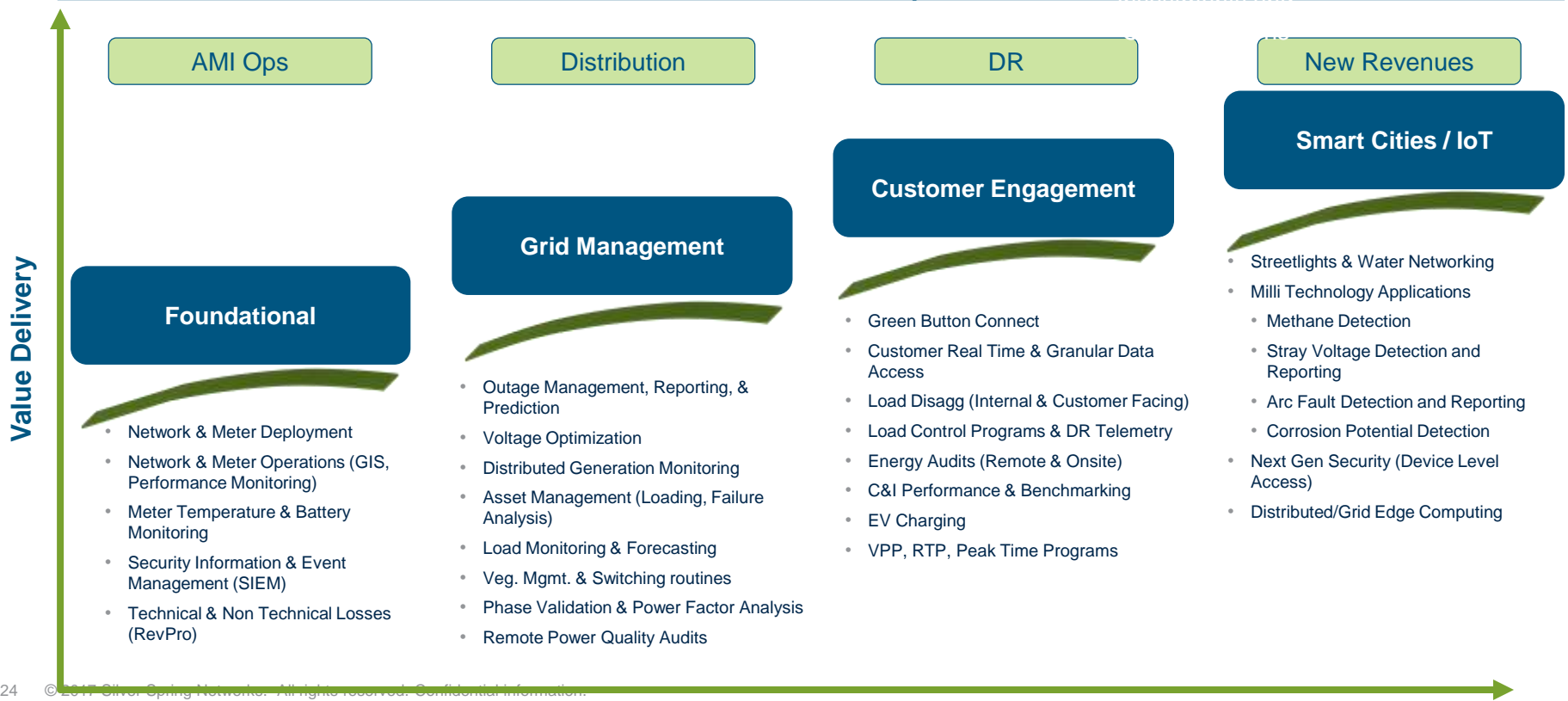


# The Right Sequence & Governance

## Maximize Investments and Returns

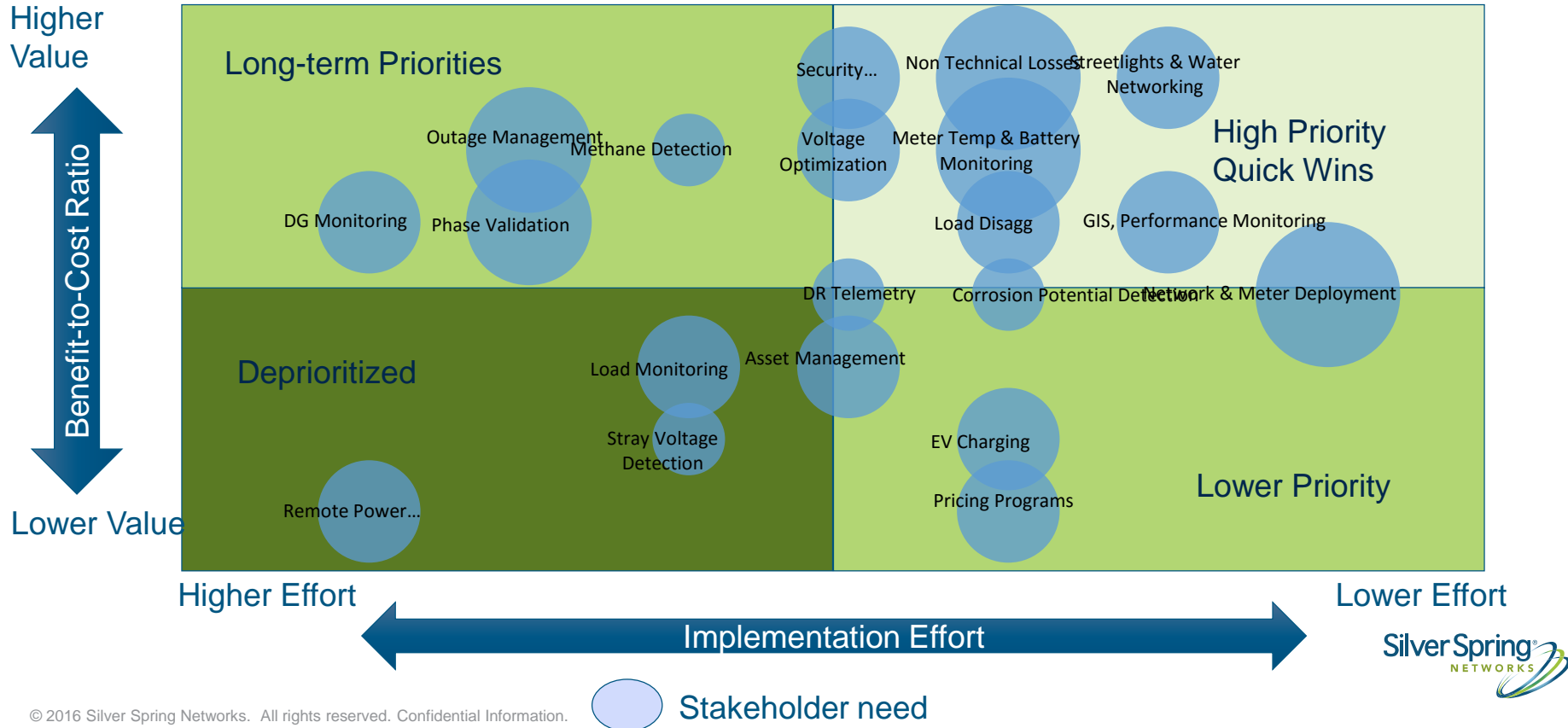
### Illustrative Roadmap

Key: Business Owner



# Quantifying, Prioritizing and Proving Use Case Value

For Illustrative Purposes (only)





**Thank You!**