Hawaiian Electric Companies Modern Grid Technology and Leading Practices Workshop

May 10, 2017

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

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

- Proven multi-application platform with >26M devices operating worldwide.
- 5th 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

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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

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Don’t Take Our Word for It

Customer Results Speak for themselves

LOWER ELECTRICITY BILLS

- $100M returned to customers annually

AVOIDED POWER OUTAGES

- 9% reduction in outage frequency
- 6.2M customer interruptions avoided since 2012

FLEXIBILITY FOR CUSTOMERS

- 20% reduction in disconnects
- Option to pay prior to disconnection
- Same day re-connection

ENABLING DERs

- 87% reduction in connection costs
- Increased acceptance rate by 17%
- Shortened approval time by 27 weeks

SAVINGS VIA DEMAND RESPONSE

- 155MW reduction in peak demand
- Annual Customer Savings:
  - $152 per residential customer
  - $305 per commercial customer

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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

ENERGYSAVVY

GRIDIUM

BIDGELY

EXCELERON

Customer specific info and recommendations drive more energy efficiency

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

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The Network Decision is Critical

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

1. Ubiquitous Coverage

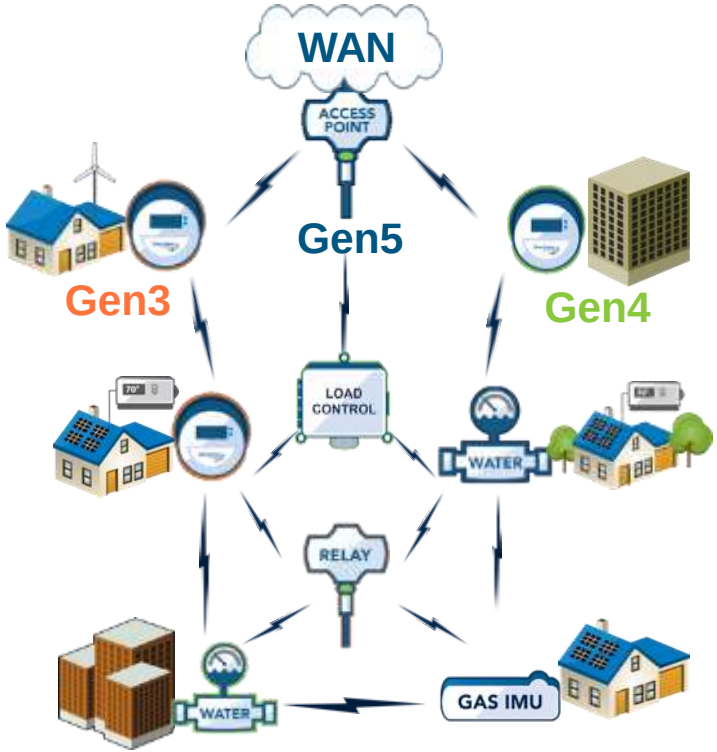
- Architecture matters: robust mesh always superior to point-to-point
- All meshes are not created equal – choose the best of breed

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.



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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.

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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-hear 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

Silver Spring NETWORKS

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ONE PLATFORM

PROVEN. CHOSEN. WORLDWIDE.

HIGH PERFORMANCE

RESILIENT AND SECURE

COST EFFECTIVE

FLEXIBLE AND EXTENSIBLE

DURABLE

Appendix

Various Materials and Support

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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

700M DAILY RECORDS, OR **255B** PER YR

ACROSS **1.5M** SQ MILES ON 5 CONTINENTS

99.9% UPTIME

4.5B DAILY BYTES

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Expanding Global Leadership in 2016 and Beyond

Silver Spring NETWORKS

Our continued innovation drives our global success

AWARDS

SMARTGRID PRODUCT OF THE YEAR 2016

IoT Product of The Year

ASIAN POWER AWARDS 2016

Aragon Research

ctia Super Mobility 2016™

CUSTOMER WINS

conEdison

PACIFIC POWER

AMP PUBLIC POWER PARTNERS

JPS Jamaica Public Service Company Limited

BGE

CPFL ENERGIA

CESC LIMITED

SINGAPORE POWER

هيئة كهرباء ومياه دبي Dubai Electricity & Water Authority

GrowSmarter Transforming cities for a smart, sustainable Europe

COMHAIRLE CONTAE MHAIGH EO MAYO COUNTY COUNCIL

City of Westminster

CITY OF PROVIDENCE Jorge O. Elorza, Mayor

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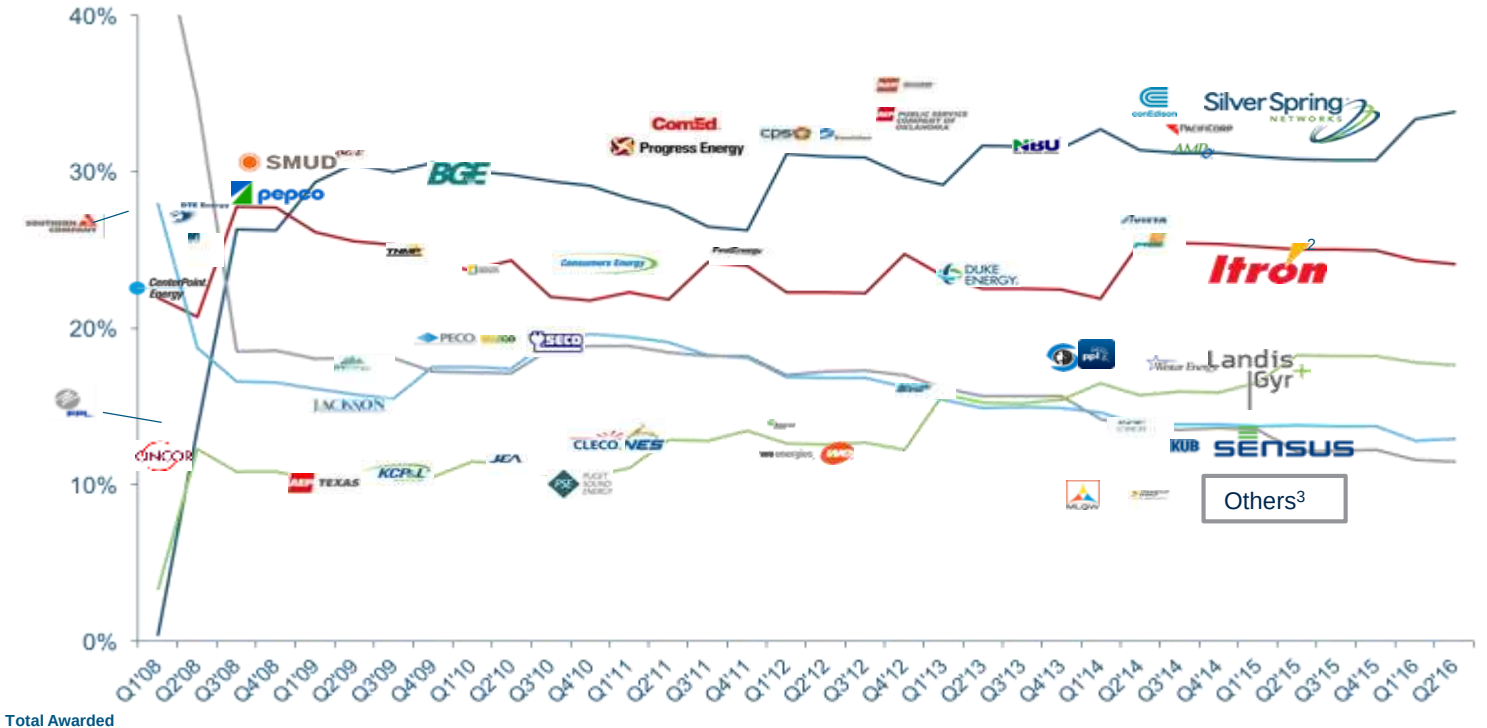
The Market Leader in Smart Grid Networking

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



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

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

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

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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

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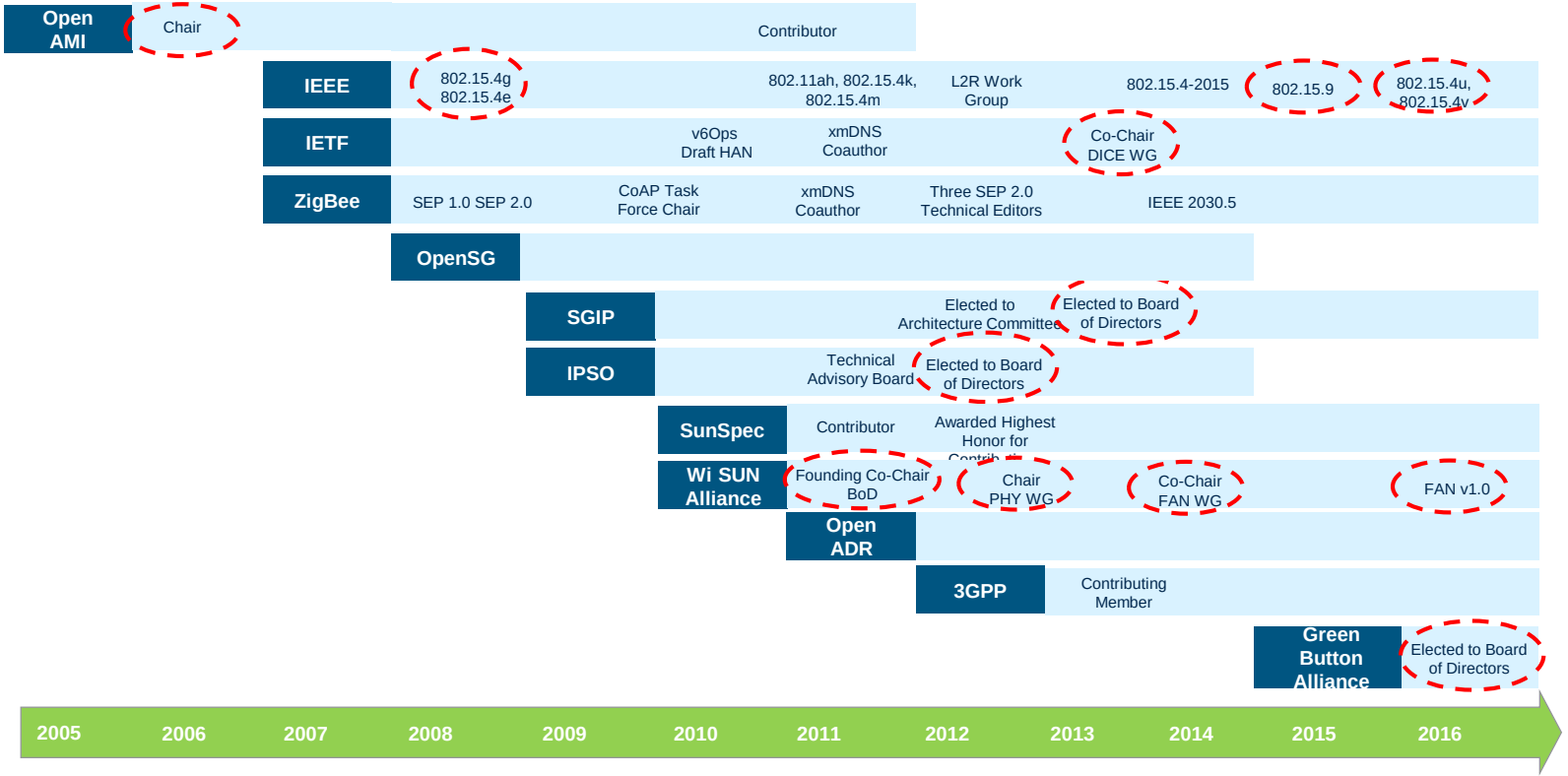
Continuous Standards Leadership



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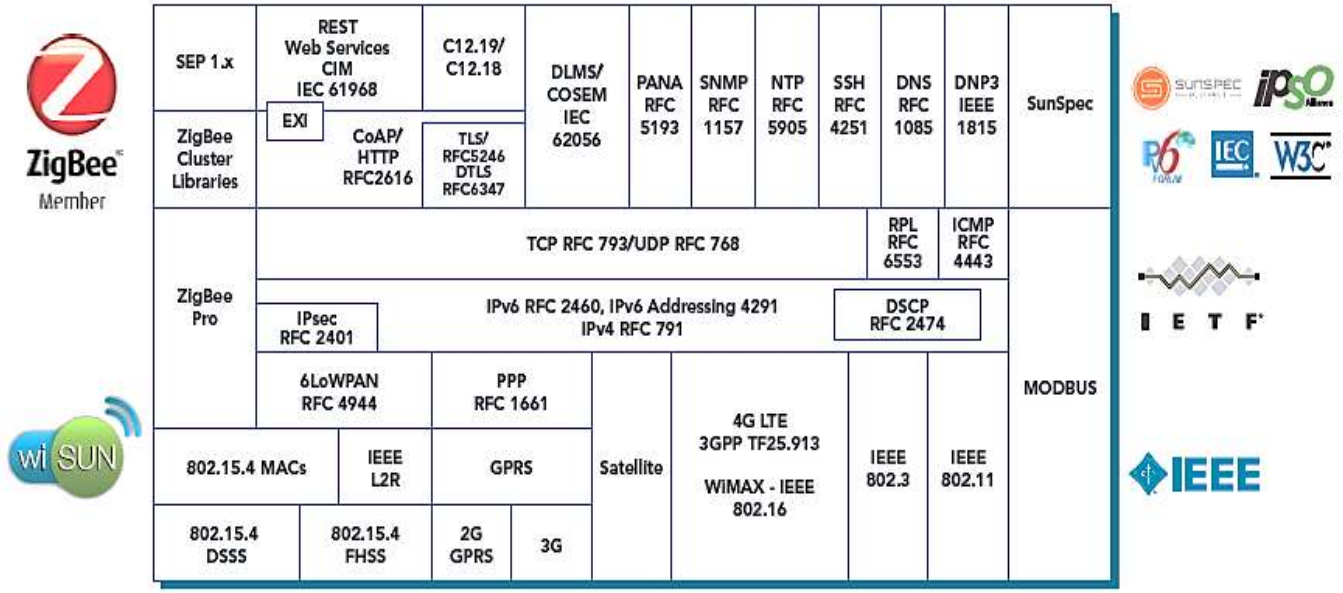
Silver Spring Platform

Standards at Every Level



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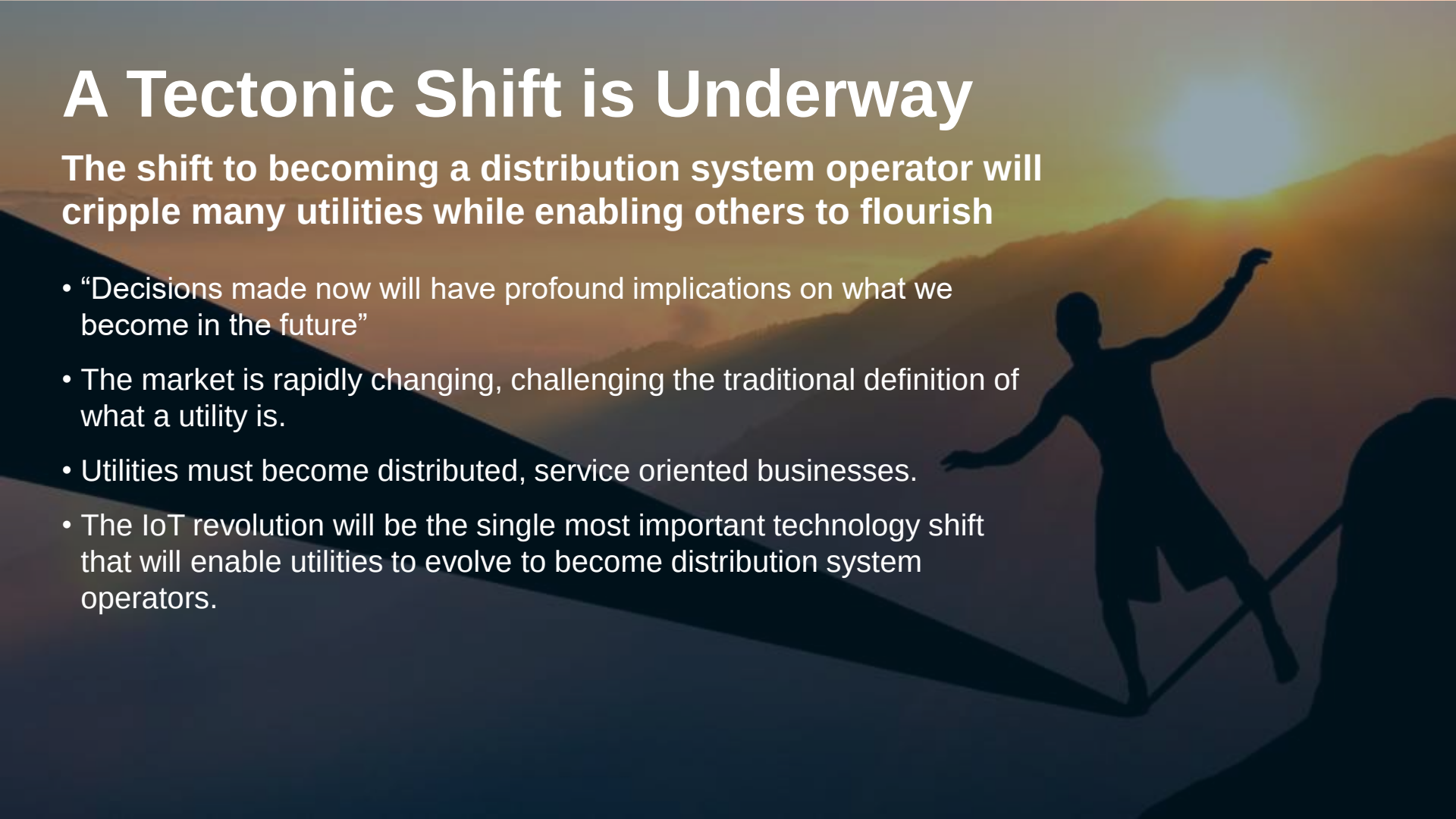
A Tectonic Shift is Underway

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

CONNECT & EMPOWER

Enhance customer choice

- Connect millions of intelligent devices from the substation to the grid edge
- Support customer, owned, third party, and utility owned assets

OPTIMIZE & SECURE

Optimize service delivery and drive operational efficiency

- Enable real time grid operations
- Seamlessly Integrate distributed energy resources

TRANSFORM

Transform your business with innovative applications and services

- Enable real time pricing programs
- Leverage excess capacity to enable IoT and smart city services for partners

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Our Visions are Aligned

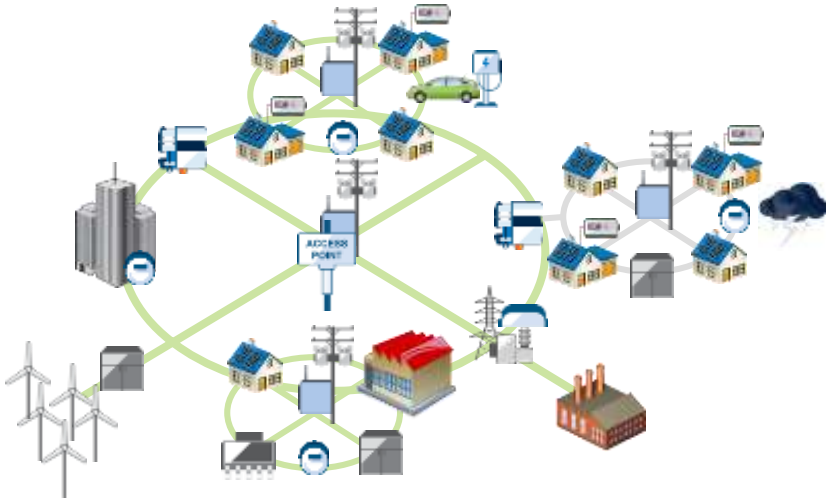
Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Silver Spring NETWORKS

EMPOWERING THE CONNECTED CONSUMER

DRIVING RESILIENCE AND RELIABILITY

CATALYZING A MARKETPLACE FOR DERs



The digital grid will unlock business transformation and customer choice

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Technology Agnostic Platform

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

Control Nodes
SELC
CIMCON
Acuity
Rongwen
Lumnex
Enlight

Cameras / Sensors
Citilog
Vimoc
Urbiotica
Streetline

Meters
Alclara
Landis and Gyr
GE Energy
ITRON
Master Meter

DA and Direct Load Control Devices
Sentient
Varentec
INCON – TransformerIQ
Several Others

Outage Management
GE
ABB
CGI
Intergraph

Robust, distributed intelligence enables breakthrough applications at the network edge

Luminaires
Acuity
Leotek
Cree
LED Roadway
GE
Phillips
Eaton

MDM
Oracle
Eco-Logic
EICT
Itron

ESB
IBM
Weblogic
Webmethods
Tibco

CIS Systems
SAP
Oracle
Utility Legacy

Demand Response
25 Device Partners
Zig-bee and Direct to Grid Options
Best Fit for Program Requirements

Representative Examples: The above partner references are not all inclusive

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Breaking the Mold

Initiatives from a few forward thinking utilities

Client	IoT Endpoints	Applications Supported
ComEd	• Electric AMI: 3.9M • Distribution Automation: 5.9K • Pilot: Street Lights, High Frequency Data, Water AMI, Gas AMI	
Consolidated Edison	• Electric AMI: 3.9M • Gas AMI: 1.3M • Pilot: Distribution Automation Methane Sensors, Carbon Monoxide Sensors, Street Lights, High Frequency Data	
Florida Power & Light	• Electric AMI: 5.9M • Distribution Automation: 25K • Street Lights: 503k	

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

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How it Works:

SilverLink Applications

ADVANCED METERING MANAGER

Full Lifecycle Management

SLV

Smart City Management

OUTAGE DETECTION SYSTEM

Outage Management

OPERATIONS OPTIMIZER

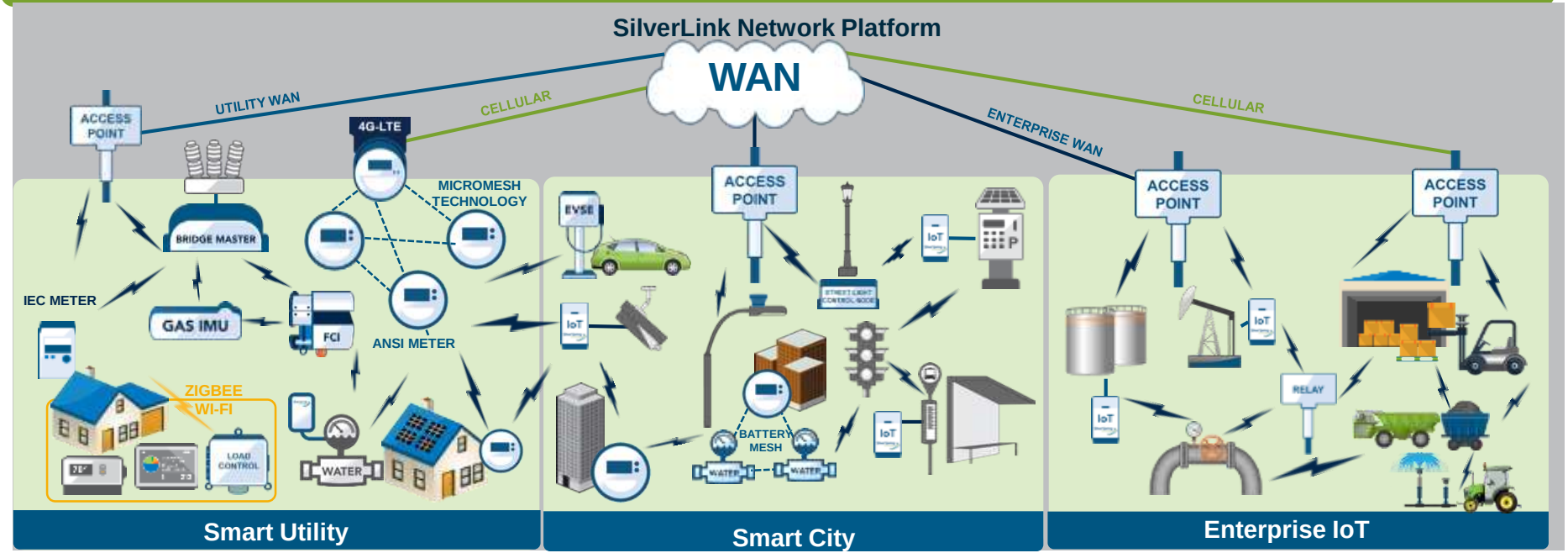
Analytics and Workflow

Third-Party Applications

Data Platform

SilverLink Control Platform

SilverLink Network Platform



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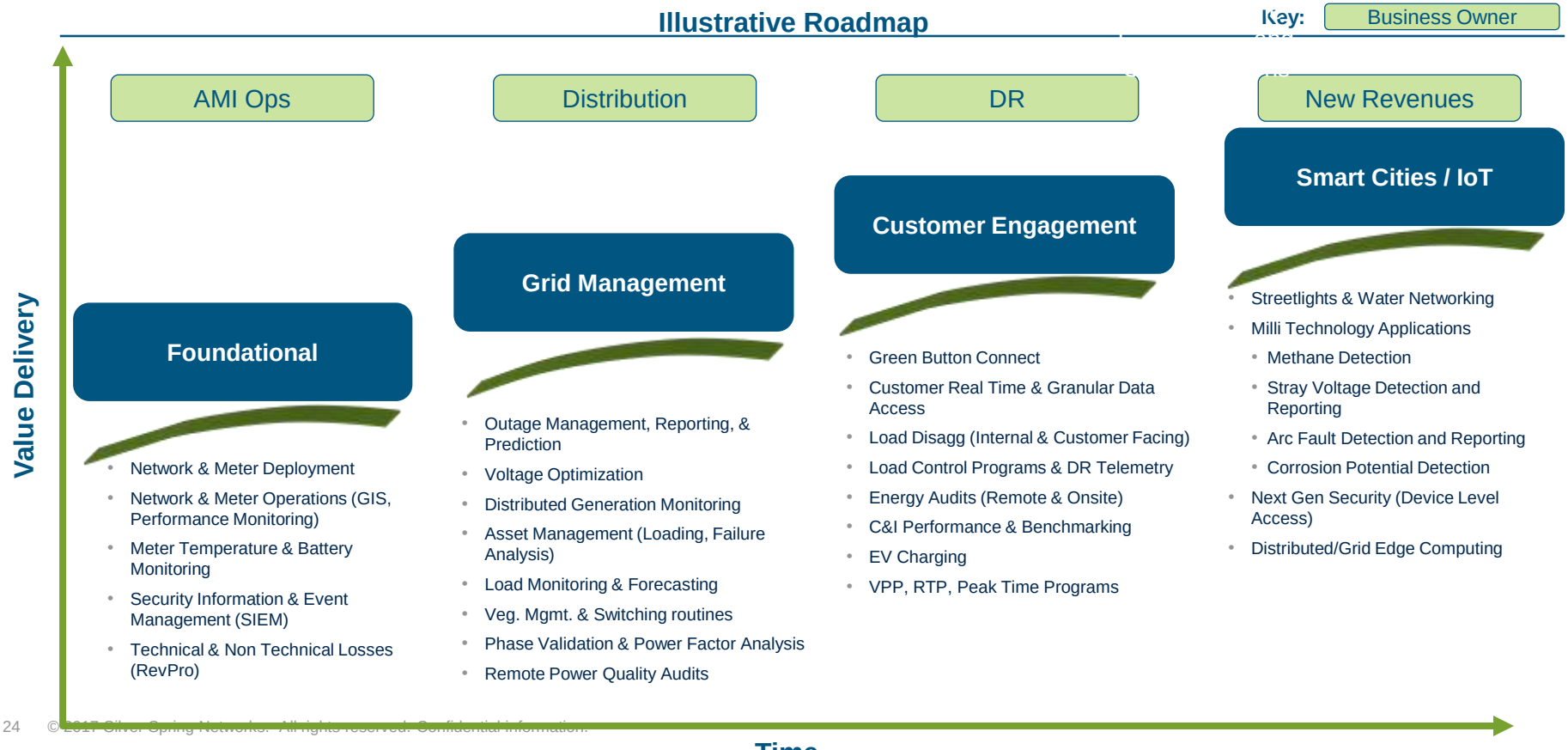
The Right Sequence & Governance

Maximize Investments and Returns



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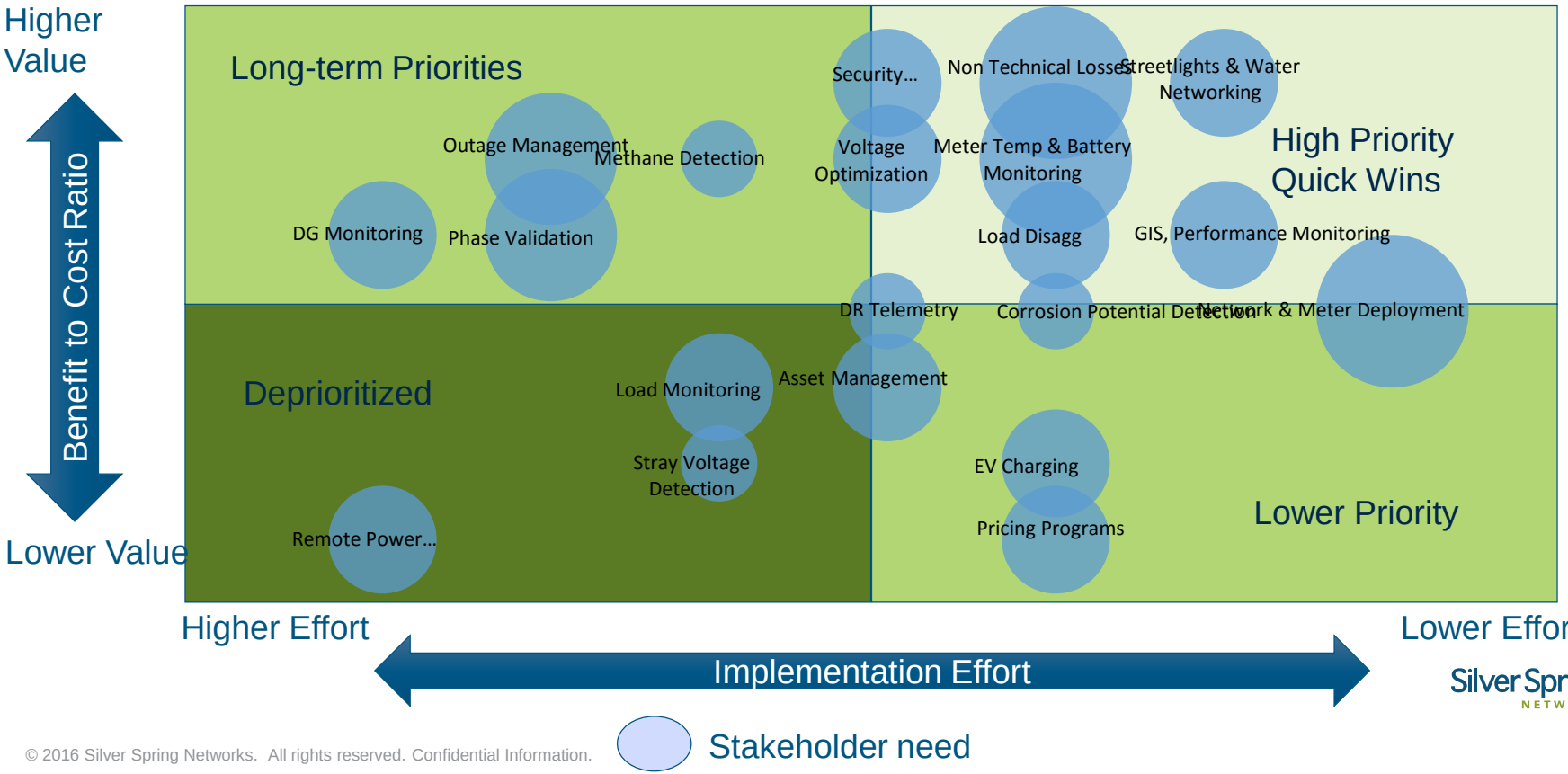
Quantifying, Prioritizing and Proving Use Case Value

For Illustrative Purposes (only)



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Thank You!

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