



S&C Electric: Intelligent Grid Technologies

Licensing & Commercialization Opportunity

tradespace

Licensing Opportunity:

Microgrid & Utility Equipment



Client: S&C Electric (S&C) is a world leader in the switching, protection, and control of electric power systems

Available Technology:

- Advanced Microgrids
- Distributed Static Compensator (DSTATCOM)
- Uninterpretable Power Supply
- Distributed Energy Management
- Asset Management Software

Opportunity: S&C has engaged Tradespace to approach select partners to license its portfolio of grid and utility equipment technologies

Key Applications

- Islanding
- Load Shedding
- Reactive Power
- Utility Network Visualization, Monitoring, and Analysis
- Renewable Energy

Opportunity Snapshot:

Focus: Microgrid & Utility Equipment

Patents: 25 Patent Families

Geographic Coverage: US, EP, WO, CN, JP, CA, DE, MX, AU, GB, BR

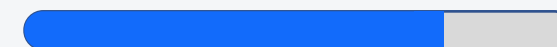
Average Filing Date: 2019

Maturity Level: Range from prototyped to In-Use (TRL 7+)

Structure: Exclusive License or Sale of entire portfolio or individual patents

R&D Team Availability: Yes

Tradespace IP Strength Score*



80%

*Based on patent age, forward citations, geographic coverage, family size, etc.

S&C Electric Corporate Overview



HQ Location: Illinois, US

Year Founded: 1911

Industry: Electrical Equipment

Corporate Website:
www.sandc.com

S&C Electric Company is a global Smart Grid leader, applying its century-long history of innovation to create a more intelligent grid. S&C has deep expertise in electric power switching and protection and power quality technologies, as well as the control and communication systems needed to make the grid smarter.

R&D Capabilities



S&C Advanced Technology Center: Largest manufacturer-owned short-circuit testing laboratory in North America. It has two 850-megawatt electrical short-circuit test generators that can test up to 100 kA and up to 230,000 volts.

S&C IP Portfolio Snapshot







Technology Area	Patents	IP Strength
💡 Energy	83	59%
📡 Sensors	17	60%
⚙️ Machinery	9	79%
⚙️ Mechanical Comp.	5	72%
📞 Communications	4	65%
🚗 Vehicles	2	83%
🏗️ Infrastructure	2	60%
🧪 Chemistry	1	70%
💻 Digital Computing	1	68%

S&C Microgrid and Utility Equipment IP Portfolio:

Available IP Overview



S&C ELECTRIC COMPANY
Excellence Through Innovation

Technology	Description	Related S&C Products	Patent Families	Tradespace IP Score
 Advanced Microgrids	Systems and SW to protect microgrid equipment, detect unintentional islanding, and energize storage management systems during black-start	Gridmaster® Microgrid Control System	9	74%
 DSTATCOM	Fast-compensating reactive power to reduce voltage variation / instability & assist in quick recovery	Purewave® DSTATCOM	2	82%
 Uninterruptable Power Supply	Tools for improved voltage disturbance detection and frequency regulation in UPS systems	Purewave® UPS	3	71%
 Distributed Energy Management	Control and coordination multiple grid-connected distribution units such as energy storage units deployed over a geographically-dispersed area	Intelliteam® Distributed Energy Management	2	85%
 Asset Management SW	Enterprise SW tools to monitor & control large numbers of assets. Enables users to create dashboards from asset & event data	Intelliteam® Feeder Mgmt System	3	89%
 Switchgear & Other Accessories	Vacuum interrupters, switching protection, insulation systems, and switchgear accessories	Flexipull®, Vista SD®	12	75%

Technology Overview: Switchgear & Other Accessories



Switchgear Accessories: Specialized tool (Flexipull®) to operate 200-ampere hookstick-operated power fuses with a Uni-Rupter® Interrupter for single-pole live switching of single-phase or three-phase load circuits

Patent Number	Patent Title	Filing Date	Availability
US10099899B2	Shake-proof hook	11/2016	License
D796,941	Shake-proof hook	11/2016	License
D778,145	Shake-proof hook	11/2015	License
US10504678B2	Remote access pull rig	11/2016	License



Switchgear (Insulation System): Load-Interrupter switches for the switching and protection of main feeders, taps, laterals, and sub-loops

Patent Number	Patent Title	Filing Date	Availability
US10587109B1	Adapter for conversion of an installed medium-voltage air termination...	06/2019	License
US10608393B2	Cable center line adapters for switchgear retro-fit applications	02/2019	License
US9385493B2	Adjustable bus bar for power distribution equipment	04/2015	License
US9362663B2	Replaceable bushing for elec. equipment	11/2016	License



Vacuum Interrupters: Vacuum switching devices with improved contact design. By wholly locating the moving components within the vacuum housing the electrode is completely under vacuum. Accordingly, the vacuum switching device has no external moving parts.

Patent Number	Patent Title	Filing Date	Availability
US10600593B2	Vacuum switching devices	06/2019	License
US10643808B2	Improvements to vacuum switching device contacts	10/2018	License



Switching Protection: Fault protection device that bypasses one of three phases without additional equipment

Patent Number	Patent Title	Filing Date	Availability
US10910816B2	Fault Protection Device with Group Trip Delay and Method	06/2008	License or Sale

Technology Overview:

Advanced Microgrids

Available IP



Adaptive Relays: Protecting microgrid components by changing power source relay protection group settings between grid-connected and islanding settings

Islanding: Voltage / frequency sensing to detect unintentional islanding and adjust reactive power

Mobile Microgrid Control SW: Control software to synchronize small generators and control frequency / voltage in a mobile power grid

Storage System Energization: Ramping up output voltage of a storage management system by limiting the inrush of currents to a microgrid's reactive components

Benefits

- **Improved Reliability:** Faster protection group setting changes & islanding condition detection reduce risk of equipment damage & outages
- **Renewable Energy:** Adaptive relays and islanding control can optimize grid performance with inconsistent power sources (e.g. solar / wind)
- **Military / Tactical Applications:** Generator control software is ideally suited for military / O&G applications
- **Black-Start:** Enables establishment of a microgrid island in the absence of the normal utility source

Available Patents

Number	Patent Title	Filing Date	Country	IP Strength	Availability	
					License	Sale
US10886737B2	Energization control for establishing microgrids	01/2017	US, WO, CA, MX	91%	✓	
US10593497B2	Micro-grid adaptive relaying	12/2018	US	61%	✓	
US10535993B2	Control system countermeasures	10/2018	US	61%	✓	✓
US10320193B2	Electrical systems and related islanding detection methods	12/2016	US, WO, CA, MX	88%	✓	✓
US10312822B2	Electrical systems and methods for islanding transitions	12/2016	US, WO, CA, MX	78%	✓	✓
US8350412B2	Dynamically controlling configuration of a power grid comprising one or more stand-alone sub-grids	06/2010	US, WO	80%	✓	
US10468886B2	Electrical systems and related frequency regulation methods	12/2016	US, WO, CA, MX	78%	✓	
US10819098B2	Flux based utility disturbance detector	12/2018	US, WO	67%	✓	✓
US10784677B2	Enhanced utility disturbance monitor	10/2018	US, WO	67%	✓	✓

Technology Overview:

DSTATCOM

Available IP



Fast-compensating reactive power to reduce voltage variation / instability & assist in quick recovery. Solid-state dc-to-ac inverters coupled to utility system to create reactive current.

Related S&C Product Details

Purewave DSTATCOM

System Voltage Continuous Output: 480 V to 35 kV, 50 or 60 Hz

Short-Term Current Rating: 264% for 2 seconds, ramping to 100% at 4 seconds; or 264% for 3 seconds

Reactive Current Response Time: 2 – 4 milliseconds

Benefits

- **Fast compensating:** Provides leading or lagging VARs in < ¼ cycle, (critical for continuously fluctuating demand like wind parks)
 - Legacy approaches (shunt capacitors, reactors, synchronous condensers) operate too slowly
- **Remote Monitoring:** Monitoring & control adjustments can be made remotely through a model connection or SCADA network
- **External Capacitor Bank Control:** Can be used to control externally switched capacitor banks, providing additional compensation at lower cost than an inverter-based system

Available Patents

Number	Patent Title	Filing Date	Country	IP Strength	Availability	
					License	Sale
US10439511B2	Three Phase Inverter Grid Voltage Feed Forward Method Under Unbalanced Operating Conditions	12/2018	US	82%	✓	✓
US10431983B2	Three Phase Inverter DC-line Voltage Control Method for Reactive Power Overload Transient Response	10/2018	US	82%	✓	✓

Technology Overview:

Uninterruptable Power Supply

Available IP



Frequency Regulation: Electrical system to detect deviations from a target frequency and correct imbalances using a power conversion module

Voltage Disturbance Detection: Algorithm and system to Calculate flux error for each of three-phase power signals

Related S&C Product Details

Purewave LV: 313 to 2500 kVA—208 to 600V up to 60 seconds

Purewave MV UPS: 2.5 to 20 MVA—5 to 25kV up to 3 minutes

Purewave MV XT UPS: 2.5 to 20 MVA—5 to 25kV for 15+ minutes

Benefits

- **High-Efficiency:** Can operate at 98% efficiency due to single-conversion design
- **Quick Response:** Algorithm uses high sampling rate to detect utility voltage deviations faster than other approaches
- **Microgrid Integration:** Can provide energy storage and frequency regulation for microgrids

Available Patents

Number	Patent Title	Filing Date	Country	IP Strength	Availability	
					License	Sale
US10468886B2	Electrical systems and related frequency regulation methods	12/2016	US, WO, CA, MX	78%	✓	
US10819098B2	Flux based utility disturbance detector	12/2018	US, WO	67%	✓	✓
US10784677B2	Enhanced utility disturbance monitor	10/2018	US, WO	67%	✓	✓

Technology Overview:

Distributed Energy Management (DEM)

Available IP



Distributed Energy Management System: System and software to control and coordinate multiple grid-connected distribution units such as energy storage units deployed over a geographically-dispersed area

Adaptive Polling: Individually configurable rate of polling to target specific taps for active management

PV Integration: DEM that addresses capacity & system disturbance concerns caused by wide deployment of PV

Related S&C Product Details

Intelliteam DEM: Can monitor up to 1,000 Community Energy Storage Units

Benefits

- **Peak Shaving:** Can control substation transformer & feeder power flow to flatten daily peaks
- **Load Leveling:** Can command energy storage units to discharge to maintain capacity margin during periods of system peak loading
- **Feeder Power Regulation:** Can command storage units to provide real or reactive power at feeder level on per-phase basis
- **Renewable Energy:** Can coordinate storage units to store output of distributed wind / PV generators and perform power-smoothing

Available Patents

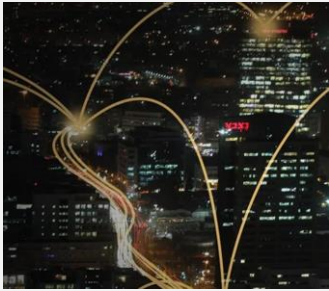
Number	Patent Title	Filing Date	Country	IP Strength	Availability	
					License	Sale
US10784812B2	Power grid photo-voltaic integration using distributed energy storage and management	06/2013	US, WO, EP, AU, CA, MX	94%	✓	✓
US10310461B2	Adaptive polling in energy distribution systems	04/2016	US, WO, EP, AU, CA	75%	✓	✓

S&C can also include significant expertise & know-how currently treated as Trade Secret

Technology Overview:

Asset Configuration / Management Software

Available IP



Dashboards & User Interfaces: Enterprise software tools to monitor and control large numbers of assets. In particular, S&C has developed tools that enable users to create dashboards from asset and event data. The tools also include filters that enable users to select data on an ad hoc basis

Protection Setting Control: Control software to automatically coordinate protection settings for relays within a grid or microgrid

Related S&C Product Details

Intelliteam Feeder Mgmt System: Device management system that includes fault interrupter, interface module, switch control, & capacitor control

Benefits

- **Reporting:** Dashboards easily track team ready statuses, battery health, etc; users can create groups to manage particular devices
- **Data Collection & Retrieval:** Replaces SCADA systems to provide automatic data collection; enables bulk data retrieval
- **Event Analysis:** Easily show sequence of events and manage / filter alerts
- **Device Management:** Manage configuration for new devices using templates and maintain change logs

Available Patents

Number	Patent Title	Filing Date	Country	IP Strength	Availability	
					License	Sale
US9880724B2	User interface for viewing event data	04/2015	US, WO, CA, CN	89%	✓	✓
US10614531B2	Filter-based dynamic power system operation dashboards	04/2015	US, WO, CA, CN	79%	✓	
US10581235B2	Method for automatically coordinating protection settings in an electric power distribution network	02/2018	US, WO, EP, AU, CA	98%	✓	

Engagement Opportunities

S&C has engaged Tradespace to approach select partners to further commercialize its portfolio of microgrid and power equipment IP

S&C is interested in Partners for the following models:

- Patent Licensing (Exclusive & Non-Exclusive)
- Technology Transfer
- Co-Development

Please contact Alec Sorensen, Head of Advisory & Marketplace at Tradespace, for further information regarding the opportunity

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