SIEMENS

Siemens Power Technologies International

Reduce CAPEX and OPEX risk using modeling and simulation

Telecom consulting: Science not speculation

At a glance

The utility industry is changing at an accelerating rate, and virtually all utilities will need to upgrade or deploy new telecommunications networks in order to keep up with industry, stay above the curve, or become leaders. Grid modernization is being facilitated via the deployment of so-called smart grid applications such as smart metering, distribution/feeder automation, and countless other operations. The common thread across such applications is that they must be enabled via a sophisticated telecommunications network. As a result, the success of any grid modernization initiative hinges on making correct telecommunications planning choices that support operational requirements.

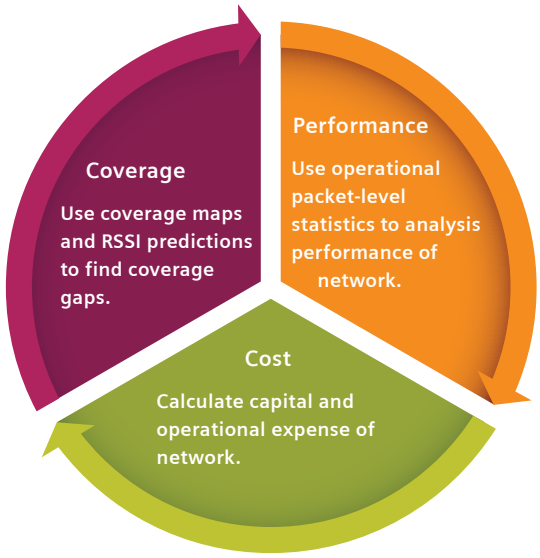
The challenge

The choice of telecommunications infrastructure is complicated by the vast and complex ecosystem of technologies and vendors offering unique benefits. An optimal telecommunications design must address several questions such as:

- Which technologies can be leveraged to handle multiple operations?
- How does the design behave under different conditions (e.g. steady state/exception, low/high speed, etc)?
- What are the data traffic requirements for grid-specific operations?
- What are the CAPEX and OPEX for each design?
- What are the optimal locations for Basestations?
- What is the potential of the design for future expansion?

Our solution

Siemens Smart Grid Telecommunications Consulting offers technology unbiased and vendor agnostic services to help utilities assess their current telecom situation, and develop an overall telecommunications strategy to propel them into the future. Our telecom engineers and consultant have the cross-domain expertise to understand power systems, the utility environment's operational needs, and how those needs map to telecom requirements.



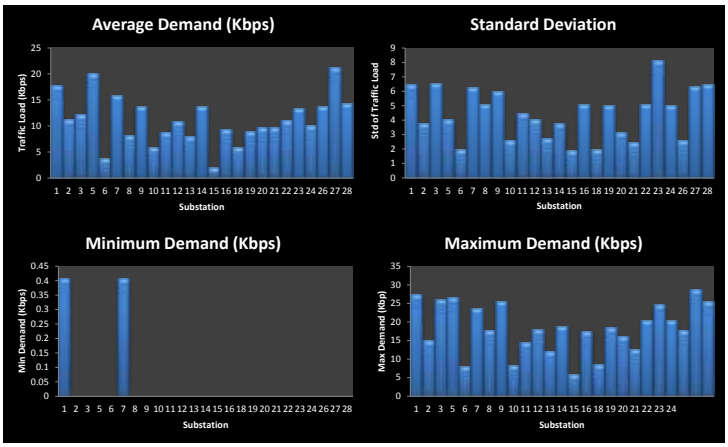
SG-CAT iteratively re-configures the network design to ensure reliable connectivity, operational success and optimized cost.

Answers for infrastructure and cities.

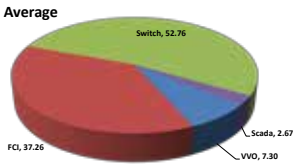
Siemens minimizes the assumptions, guesswork, risk, and subjectivity in analysis and recommendations with the use of our proven advanced simulation and modeling software Smart Grid Communications Assessment Tool (SG-CAT). SG-CAT is telecom planning software for grid-specific applications that goes beyond the capabilities of Radio Frequency (RF) planning tools by adding the dimensions of performance prediction (e.g. congestion, capacity, response time, reliability) and cost modeling. SG-CAT allows Siemens engineers to model different telecommunication technologies/ designs and evaluate how each solution will perform in real-life scenarios by simulating the utility's own topography and geography, over a period of time, and under various "what if" system operating and loading conditions.

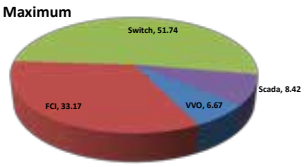
SG-CAT allows a detailed technical evaluation of the specific/ unique requirements of the utility based on their actually service area and future deployment strategies.

Aggregate Backhaul Demands at Each Substation



Operational Traffic Breakdown





System-wide	Average (kbps)	Maximum (kbps)
Volt/VAR	20.31	23.56
Fault Current	103.56	117.19
Switching	146.67	182.81
SCADA	7.44	29.74
Total	277.97	320.09

SG-CAT's simulation engine collects individual operational performance statistics, such as latency, packet loss, etc., from every device allowing detailed comparison for every combination of telecom design and smart grid application included in the study. This statistics are aggregated to create global statistics for each scenario allowing analysis to determine the most suitable telecom design.

	Design A	Design B	Design C	Design D	Design E	Design F
B.O.M. - Hardware	$2.480 M	$2.628 M	$2,618 M	$3,104 M	$2,462 M	$900 M
B.O.M. - Software	$250 K	$250 K	$250 K	$250 K	$250 K	$250 K
Installation/Construction	$369 K	$444 K	$771 K	$898 K	$775 K	$204 K
Professional Services	$1,365 M	$1,439 M	$1.434 M	$1.677 M	$1.356 M	$575 K
CAPEX - 5 years	$4,465 M	$4.762 M	$5.074 M	$5.930 M	$4.844 M	$1,931 M
OPEX - 5 years	$1.250 M	$1,600 M	$1.500 M	$1.500 M	$1.725 M	$2.279 M
Total - 5 years	$5.715 M	$6,362 M	$6.574 M	$7.430 M	$6,569 M	$4,210 M

SG-CAT considers the fully-loaded cost under proper configuration of each telecom design so an accurate assessment can be performed.

siemens.com/power-technologies

Siemens AG
Power Technologies International
Freyeslebenstrasse 1
91058 Erlangen
Germany

Siemens Industry, Inc.
Siemens Power Technologies International
400 State Street
P.O. Box 1058
Schenectady, NY 12305

Order No.: IC1000-E240-A182-X-4AUS

Answers for infrastructure and cities.