

# Case Study

## Centralized Monitoring of Cellular Network Base Station Power Supply

### Industry

- Remote Monitoring
- Remote Service
- Network Management

### Partners

The logo for flexenclosure, featuring the word "flexenclosure" in a white, lowercase, sans-serif font centered within a solid orange rectangular background.

### Hardware

Specialized controllers running Flexenclosure Diriflex™ OS based on Windows XP Embedded



### Flexenclosure Company Profile

Flexenclosure is a supplier of power management systems, complete data centers and other end-to-end site solutions for the telecom industry. The company provides total systems that are fully integrated, flexible, factory tested for reliability, prefabricated, adaptable to local conditions and quick to install.

Flexenclosure's flagship product is E-site, an intelligent green base station site power management solution for off-grid markets, mainly powered by renewable energy sources (sun and wind) and with an intelligent control system (Diriflex). E-site can bring a 90 percent reduction in diesel fuel consumption, CO2 emissions and energy OPEX compared to traditional diesel-based solutions. E-site enables mobile operators to access new markets and make operations in existing markets more profitable, with a quick ROI and the lowest long-term TCO.

Flexenclosure was founded in 1989 and is based in Vara, Sweden, with offices in Nairobi (Kenya), Singapore and Gurgaon (India). Customers are global telecom companies like Ericsson, Airtel, MTN and Zain.

### Challenges

eSite stations deployed by Flexenclosure are smart enough to support complete web-based monitoring and control along with remote service via SNMP. However, centralized management was necessary to solve a set of tasks:

- Providing aggregated performance reporting for multiple eSites
- Collecting statistical data in a single protected location
- Ensuring easy reconfiguration for eSites which experience frequent network interruptions

- Enable coordinated operator alerting upon hardware failures and security breaches
- Offering deep analytics and automated optimization hinting based on performance data collected from a large network

## Solution

eSite operating system has been initially capable of reporting all metrics via secure SNMP v3. Industry's best SNMP support of AggreGate Network Manager made it possible to quickly roll out the first version of centralized eSite management system based on AggreGate Network Manager. The rebranded version of AggreGate Network Manager was called eManager.

In the meanwhile, it became evident that SNMP protocol had a number of problems preventing its efficient usage in this area. One of the major issues was SNMP's missing support for "operations", such as firmware upgrade or device reboot initiation. SNMP hardware vendors are used to solving this by providing some "fake" settings which trigger the operation, and subsequent polling allows finding out whether the operation is complete. However, this is hardly useful for production environment.

After conducting extensive research in this area, Flexenclosure has opted for using AggreGate Agents in eSite-to-server communications. A version of AggreGate Agent implemented in .NET Compact was embedded into Diriflex operating system, making it natively compatible with AggreGate communication protocol and adding "operations" support. Plus, unreliably delivered SNMP traps were substituted by AggreGate events routed through an SSL-secured connection and confirmed by the server.

Technically, the Flexenclosure eManager is a set of custom analytical extensions to AggreGate Network Manager. This is a cloud-hosted energy management system fully integrated with eSites for proactively monitoring, analyzing and optimizing the performance of the entire eSite network.

By monitoring and collecting 100+ data points per eSite, AggreGate Network Manager provides unparalleled capability for comprehensive benchmarking, performance analysis and forward planning, with real-time and historic data from all connected sites stored in a network energy data warehouse. And with its sophisticated reporting tools, eManager can create any combination of standard or customized reports for any geographical region – local to global – identifying key trends and opportunities for further optimization.

With site energy requirements constituting such a high proportion of operator OPEX, AggreGate Network Manager can drive substantial cost savings through optimizing the performance of the entire network of eSites. Detailed histories for all relevant energy data and KPIs, such as site load, grid power and diesel consumption, power outages, battery use, cooling data and power generation, mean that AggreGate Network Manager offers a comprehensive site and network

Site ID	Site Name	Genset Power			Genset Energy	Runhours To Service	Estimated Days To Service	Rectifier Max Phase Current
		Maximum	Average	Minimum				
Com	Com (auto-registered)	0 W	0 W	0 W	0 kWh	300.00 hours	362.00 days	2 A
E002	E002 (auto-registered)	0 W	0 W	0 W	0 kWh	0.00 hours	348.00 days	2 A
E005	E005 (auto-registered)	41 W	41 W	41 W	0 kWh	0.00 hours	345.00 days	2 A
E011	E011 (auto-registered)	52 W	52 W	41 W	0 kWh	0.00 hours	347.00 days	2 A
E012	E012 (auto-registered)	29 W	29 W	29 W	0 kWh	0.00 hours	345.00 days	2 A
Engelbrekt	Engelbrekt (auto-registered)	10494 W	766 W	0 W	0 kWh	223.00 hours	294.00 days	9 A
Rec93	Rec93 (auto-registered)							

Site ID	Site Name	Consumed Power	Solar Power	Genset Power	Daily Genset Run...	Genset Runtime...
1005	E-site	48 W	0 W	0 W	0 hours	0 hours
1006	E-site	0 W	0 W	0 W	0 hours	0 hours
1005	E-site	42 W	0 W	0 W	0 hours	0 hours
1011	E-site	46 W	0 W	0 W	0 hours	0 hours
1011	E-site	37 W	0 W	0 W	0 hours	0 hours
1012	E-site	52 W	0 W	0 W	0 hours	0 hours
1012	E-site	52 W	0 W	0 W	0 hours	0 hours
Rec93	E-site	0 W	0 W	0 W	0 hours	0 hours

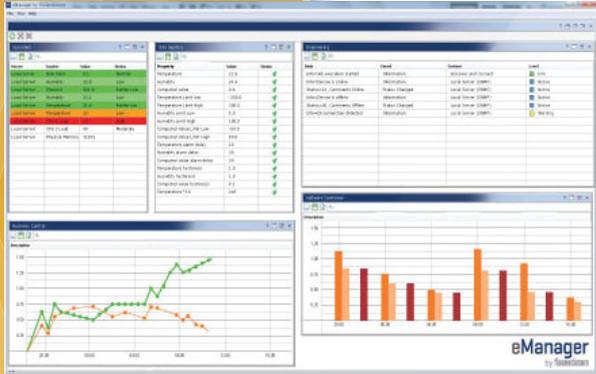
Engelbrekt    GPS Coordinates: E 10°2'3" N 40°5'6"    Status: Online-Synchronised

E-site    Last synchronisation time: 11:05

Genset	Value
Operational Mode	Auto
Commanded State	Off
Present State	Running
Present Genset Power	0 W
Present Phase Voltage	0 V
Genset Fuel	OK
Run Hours To Service	223 hours
Estimated Days To Service	294 days
Total Run hours	19 hours
Phase Current Limit	9 A
Genset Rectifier Information	Info

picture. AggreGate Network Manager's monitoring options include alarm lists, geographical maps showing site status, user defined reports and a customizable dashboard that highlights deviations from the norm.

Fully integrated into eSite framework, AggreGate Network Manager offers true scalability so that it can be used to optimize and ensure reliability of power across potentially thousands of telecom sites. Further, AggreGate's cloud-based technology means that wherever they are, authorized users have 24/7 access from any computer equipped with a web browser, perfect for international companies which need to combine data from different countries into regional and global reports. Alternatively, a server can be deployed at the customer's premises.



## Benefits

AggreGate Network Manager coordinates all energy-related data in a single, comprehensive interface, and through a wide range of reporting options allowing building a customizable data picture to support every aspect of the network, from engineering and operations to site logistics and business control. This means better opportunities for data analysis,

management of OPEX, tighter tracking of assets, faster response time to site critical failures, and reduced frequency of site visits.

Flexenslosure customers can benefit from all the real-time performance data and alarms needed to plan the budget for maintenance and refueling effectively, proactively manage unforeseen events and make better commercial and technical decisions from Day One, ensuring reliable site power and optimized performance across the networks.

## About Tibbo

Located in Taipei, Taiwan, Tibbo Technology Inc. brings simplicity to the automation world defined by enormous complexity of operating systems, programming languages, and design tools. Tibbo's programmable hardware and the AggreGate Platform offer a complete solution for delivering robust, distributed automation and monitoring systems.