NETSCOUT®

Enabling the Smart Grid - nGeniusONE Platform for Advanced Metering Infrastructure

Energy companies are undergoing digital transformation to differentiate competitively while keeping up with customer demands, growth in energy consumption, the industry's migration to distributed power generation, and compliance, safety and green energy regulations. One challenge driving digital transformation is trying to level out power demands to reduce peaks and valleys. This improves the cost structure to maintain competitiveness by not running plants at peak generation and reducing the need to buy additional power on the open market. It also helps avoid brownouts and rolling power outages during peak demand. Fluctuations are caused both by variable demand as well as variable generation from green energy and customer generation.

The smart grid, which will simplify power leveling, is becoming wide-spread and even required by law in many localities. Smart grid allows power companies to gather real time data on power consumption, and generation, by individual consumers. Power companies gather this data and take advantage of big data analytics to correlate it with environmental data and social data, such as holidays, to gather business intelligence

helping to understand and predict demand. These Power companies offer variable rate plans that require near real-time communication over the Advanced Metering Infrastructure (AMI) from hundreds of thousands of devices, extensive data storage, and powerful analytics. To be effective and meet the objectives of AMI initiatives, the service needs to be highly available and responsive. Slowdowns and outages of this service must be avoided.
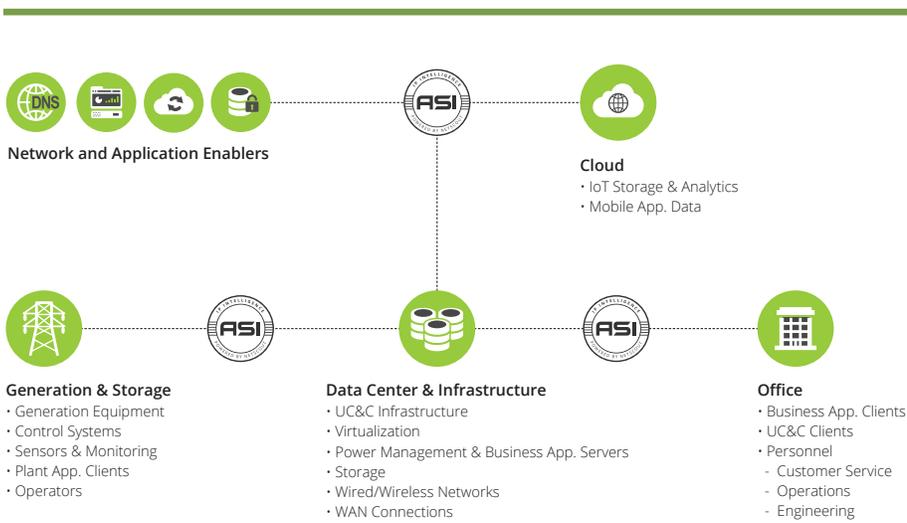
The nGeniusONE® Service Assurance platform provides real-time analysis and visibility of the application traffic flows the business depends on over the AMI and throughout the network. nGeniusONE is powered by Adaptive Service Intelligence™ (ASI) technology, a patented highly scalable deep packet inspection engine that leverages rich traffic-flow data for extracting key performance metrics from across the service domains. Using ASI, nGeniusONE provides seamless top-down workflows to quickly triage performance issues impacting generation, distribution, and business services, providing significant reductions in Mean Time to Repair (MTTR).

nGeniusONE - Proactive Service Assurance

The nGeniusONE platform provides proactive service assurance with immediate identification of developing problems across the energy company's infrastructure. It analyzes network and application traffic to deliver end-to-end visibility into the availability and performance of both internally- and externally-facing applications, service enablers and end-points, operating over on-premises and remote wired, wireless and hybrid cloud infrastructures. By understanding the relationships between the various energy specific applications (for usage control, generation monitoring, billing, etc.), network, C12.22 protocol for smart meter communication, databases, and service enablers such as DNS, DHCP and LDAP/AD, nGeniusONE can monitor and analyze the overall services the business relies on. nGeniusONE tracks and trends the activity related to each service to provide proactive notification of problems, expedite troubleshooting, and deliver factual information promoting collaboration between system/network owners.

Examples of issues addressed by nGeniusONE in the energy industry include:

- **Server Load Issues** – nGeniusONE delivers visibility into the load to and from each application and database server including web servers use for customers' interactive power control.
- **Session Latencies** – nGeniusONE identifies the cause of slowdowns between smart meters and the data centers which could be caused by bandwidth contention, slow connections, virtual services, or key service enablers.
- **Connection Issues** – When usage data for a community is delayed or not available, nGeniusONE analyzes AMI traffic and determines the cause, whether it is application servers, network switch misconfiguration and/or DHCP and Active Directory privilege issues.
- **Impact** – nGeniusONE shows the service impact of degradations not only indicating which services are impacted and how, but also the location of the impacted users and equipment.

Network and Application Enablers

Cloud
• IoT Storage & Analytics
• Mobile App. Data

Generation & Storage
• Generation Equipment
• Control Systems
• Sensors & Monitoring
• Plant App. Clients
• Operators

Data Center & Infrastructure
• UC&C Infrastructure
• Virtualization
• Power Management & Business App. Servers
• Storage
• Wired/Wireless Networks
• WAN Connections

Office
• Business App. Clients
• UC&C Clients
• Personnel
  - Customer Service
  - Operations
  - Engineering

Figure 1: The nGeniusONE platform provides business assurance through monitoring applications and services ranging from power management to business enablement to keep the entire organization operating efficiently and effectively to maximize profits while ensuring safety, regulatory compliance, and customer satisfaction.

Seamless Top-Down Workflows

The nGeniusONE platform leverages the power of ASI to help IT teams maintain high availability and optimal performance of mission critical smart grid and business applications. The data is efficiently organized so it can be viewed by location, local and cloud networks, Quality of Service (QoS), servers, applications, etc. This enables the nGeniusONE platform to offer a top-down workflow-based approach to problem identification, service triage, and resolution.

The nGeniusONE platform provides a consistent set of service-oriented workflows enabling seamless, contextual transitions across multiple layers of analysis. This allows the platform to facilitate efficient and informed hand-off of incident response tasks across different groups, fostering IT team collaboration.

nGeniusONE enables IT to deliver high quality, consistent user experience and machine communications for smart grid and traditional business services by providing the following key analysis layers:

- **Service Dashboard** – The dashboard delivers real-time status conditions, metrics, alarms, and intelligent early warning of application performance problems. IT teams can use the dashboard to quickly spot performance issues related to composite services including smart grid and business application server components, integrated web and cloud components, key middleware, service enablers, and backend databases in a single view.

- **Service Dependency Map** – The Service Dependency Map provides visibility into the dependencies across the AMI environment including web servers, DNS servers, front-end load balancers, switches, routers and other essential smart grid elements. This enables IT teams to analyze the service delivery environment and discover the client-server relationships and performance.

- **Service Monitors** – Service monitors, including the Universal Monitor, enable IT teams to quickly triage and isolate the sources contributing to performance degradation within multitier environments, including web servers, Active Directory servers, application servers, backend databases, and virtualized components. Using these monitor views, IT teams get a consolidated view of application request workloads, traffic latencies, authentication and DNS errors, providing holistic visibility into the performance of AMI and the interactive power management services that rely on it.

- **Session Analysis** – Session Analysis views help IT teams analyze transaction latencies, network-related information (e.g., average response time and QoS class assignments), as well as detailed session and flow information for specific plant data, grid data, and business data.

- **Packet Analysis** – Integrated nGeniusONE Packet Analysis enables IT teams to perform deep-dive protocol level analysis and forensic evidence collection of applications and services such as SCADA, CRM, UC&C, and other business critical services from multiple vendors.

- **Grid View** – Provides a customized overall view of the AMI environment, showing important graphs for mission critical services.

A majority of performance issues can be efficiently triaged by using the dashboard and service monitor screens alone. However, should deep-dive troubleshooting be needed, IT teams can contextually drill down to the Session and the Packet Analysis layers.

Benefits of nGeniusONE Solution

Energy companies who have moved, or are moving, to the smart grid benefit from the value of NETSCOUT® solutions:

- **Proactively Detect and Notify Administrators of Issues** – Improve response to issues with proactive notifications when performance or availability suffers, such as with machine to machine communication from smart meters to the central server.

- **Automate Root Cause Analysis** – Situation Analysis finds root causes of various performance issues as well as the impact. Correlating seemingly disparate latency, failures and errors to isolate problems and root cause quickly.

- **Triage Complex Issues Quickly** – Decreases MTTR with end-to-end, comprehensive service visibility that enables IT teams to quickly understand business and smart grid application performance issues and pinpoint the source of problems, including service enablers such as DNS, LDAP, DHCP or RADIUS, impacting the end-to-end processes.

- **Single Solution Supporting All Application Layers** – Enables continuous monitoring of application service performance across the multi-vendor, hybrid infrastructure to implement and manage smart grid projects with confidence.

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