Remote Operations
For Industrials

Ensure operations continuity and workforce flexibility with secure remote/mobile plant controls

Industrials are re-evaluating emergency preparedness, control procedures, and the need to operate reliably with reduced on-site staff.

**GE Digital Remote Operations** is a secure and scalable solution to rapidly enact and permanently adopt remote/mobile control procedures that ensure business continuity and optimal workforce flexibility.

**What is Remote Operations?**
Remote Operations is a packaged software and appliance solution that provides remote/mobile worker access to essential HMI monitoring and control functions. A unique secure network system, hard-token credentials and granular access controls ensure that remote, mobile and on-site operators can work independently or together in a secure and NERC-CIP compliant environment.

Remote Operations is available in several packages, accommodating needs from urgent continuity to fault tolerant fleet-wide operations centers.

**Operate From Anywhere**
Remote and mobile workers have secure and managed access to equivalent on-site HMI visualizations and essential operational controls regardless of HMI solutions in production. Zero-trust security, control room managed access rights, and operational safeguards provide secure and failsafe operational flexibility across remote, mobile and on-site staff.

**Secure and Compliant, End-to-End**
Remote Operations is built around a secure connection broker appliance featuring two-factor authentication; role, time and equipment-based access controls; session logging and recording; and encrypted pixel-only data transfer. The solution meets compliance standards for NERC-CIP and many others.

**Benefits**
- Ensure operational reliability
- Empower a flexible workforce
- Guard personnel health & safety
- Remain secure & compliant
- Act with urgency

**Receive Immediate Answers for operations continuity**

**Remote Operations Response** is a special packaged offer that immediately enables remote/mobile monitoring and assistance for plant operations. Rapid remote installation can be done in a single day without unit shutdown.


**Solution Packages**

Remote Operations is available in three upwardly compatible packages RO Response, RO Standard, and RO Advanced. All include the core end-to-end security and compliance features.

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>STANDARD</th>
<th>ADVANCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote/mobile HMI monitoring and assistance</td>
<td>Rich remote/mobile HMI operational controls. Tailored mobile user experience.</td>
<td>High availability remote operations Advanced optional features</td>
</tr>
</tbody>
</table>

**Remote Operations Response** is a special packaged offer to rapidly enable remote/mobile monitoring and assistance for HMI systems. It is compatible with existing systems, and requires only the addition of a pre-configured secure network appliance and firewall. Upon equipment arrival, installation can be done in a single working day with remote support from GE. No unit shutdown is required.

**Features**

- Remote/mobile HMI monitoring
- Emergency HMI controls access
- Rapid, non-disruptive deployment

**Remote Operations Standard** delivers enhanced remote/mobile functions guarded by permitting and policy controls. Mobile workers have a tailored mobile-first experience. Central operators can control remote/mobile worker access by time, equipment and more. An interactive interface ensures that remote, mobile and on-site staff can work independently or together in a secure and compliant environment.

**Additional Features**

- HMI permitting and controls
- Tailored mobile device experience
- Optional features and customization

**Remote Operations Advanced** provides full remote/mobile controls and additional optional operating capabilities in a high availability configuration with failover. Remote Operations Advanced is the best choice for companies adopting remote and distributed controls as a standard, failsafe operating model for one or more facilities.

**Additional Features**

- High availability / failover deployment
- Remote E-Stop for Power Generators
- Rich optional features & customization

---

**Remote Operations - Solution Options**

<table>
<thead>
<tr>
<th>Security-first, zero-trust design NERC-CIP+ compliant Across all options</th>
<th>Response</th>
<th>Standard</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate operations continuity</td>
<td>Remote monitoring &amp; assistance Emergency &amp; contingent controls</td>
<td>Fully enabled workforce flexibility Location independent ops Staff flexibility &amp; safety</td>
<td>Failsafe operations and rich options A pillar of operations strategy Capable of full remote operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature</th>
<th>Response</th>
<th>Standard</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Connection Broker security appliance</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Secure Firewall appliance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Two-factor authentication via supplied hard tokens</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Remote/mobile HMI access</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Remote/mobile HMI permitting</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Purpose-built mobile user experience</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>High availability with failover</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Options</th>
<th>Response</th>
<th>Standard</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote E-Stop**</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Command Center</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Communications Platform</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Automated Rounds (requires APM software)</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Install, configure, customize, test (Add shipping time of 1-3 weeks)</th>
<th>2 - 4 hours No shutdown required</th>
<th>10 – 12 weeks estimated</th>
<th>12 – 14 weeks estimated</th>
</tr>
</thead>
</table>

1. NERC-CIP+ compliant: Across all options
2. Remote E-Stop**: Requires APM software
Additional Options for Remote Operations

Remote Operations Advanced delivers a robust solution for customers employing remote/distributed operations as a core pillar of their business strategy. It can be further enhanced with centralized, intuitive visualization, advanced communications and automated data collection.

**Command Center**

Gain a 360 degree view of plant, fleet, and assets, not chained to location

**Command Center** is a secure system to aggregate data into actionable information enabling enterprise-wide collaboration, regardless of location. Through Command Center’s code-free design experience, organizations can easily create intuitive dashboards that monitor, analyze, and operate enterprise control rooms, fleet, and even equipment drill-downs - remotely in a securely contained environment.

**Communications Platform**

1:1 and group messaging platform
Voice, video, text & content across devices

**Communications Platform** provides a secure and highly available cloud-based platform for multi-media communications between workers and across teams. Mission-critical features include targeted broadcasting, hotline groups, location tracking and hands-free use. Recording and usage analytics provide tracking and insights into operations. The secure solution is certified by: HIPPA, ISO 27001, SOC2 Type II, FIPS and more.

**Digital Inspections**

Automated data collection using cameras or sensors reduces operator workloads

**Digital Inspections** uses cameras, remote sensors and more to continuously collect equipment data readings without physical operator inspections. Data is automatically uploaded into the GE APM software system where it can be used alongside historian and other collected data to trigger policy-driven and analytics-based predictive or urgent maintenance procedures.

**Features**

- Proficy Operations Hub easy drag and drop design tool
- GE Edge high-availability server hosts multiple complex applications via virtual machines for infinite scalability
- Connect, display and aggregate data from equipment historian, HMI/Scada, DCS, or other applications

**Mobile HMI Features**

The purpose-built mobile HMI software provides a rich and failsafe user experience across standard devices. Key features include:

- Familiar HMI experience in compact, mobile-first form
- View-only access as default operational mode
- Interactive control switching with control room
- Unlocking and pop-out features to confirm intent
- Support for tablets with stylus
- ATEX cases and lanyards support
### Secure and Compliant Remote Operations

GE Digital Remote Operations is designed from the ground-up to meet the stringent security and compliance requirements required of industrial companies.

#### Key Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System or application access control</td>
<td>Provides secure access to systems and applications.</td>
</tr>
<tr>
<td>System access auditing</td>
<td>Tracks access attempts and data usage.</td>
</tr>
<tr>
<td>User authentication via token-based MFA</td>
<td>Ensures secure user authentication.</td>
</tr>
<tr>
<td>Timed user access permissions</td>
<td>Controls when users can access systems.</td>
</tr>
<tr>
<td>Live user monitoring</td>
<td>Monitors user activity in real-time.</td>
</tr>
<tr>
<td>User session screen recording</td>
<td>Records and stores user activities.</td>
</tr>
<tr>
<td>Moderated unidirectional file transfer</td>
<td>Manages file transfer between systems.</td>
</tr>
<tr>
<td>VNC-based access (no data in transit)</td>
<td>Transports data securely across networks.</td>
</tr>
<tr>
<td>IPSec or SSL encryption</td>
<td>Encrypts data for secure transmission.</td>
</tr>
<tr>
<td>Network segmentation</td>
<td>Separates network zones for security.</td>
</tr>
</tbody>
</table>

NERC-CIP, ISA 99/62443, HIPAA, NIST 800-53 compliant

#### Remote Connection Broker

The unique Remote Connection Broker provides the core security and operational functions of Remote Operations, delivering a set of secure and compliant features that are unavailable with either custom-built IT projects or standard commercial communications products.

The Remote Connection Broker serves as the intermediate system for network and protocol isolation, reducing the attack surface by securely streaming applications and converting remoting protocols into an encrypted display which can be presented into any browser.

Administrators control granular user access policies by time, equipment and more, but control room operators retain interactive permission-based transfer of control. Remote/mobile staff authenticate via registered hard tokens live monitoring and session recording features provide additional safeguards and historical records.

#### Additional Specifications

- Remote Operations Response is intended for contingency operations in conjunction with a qualified on-site operator. Appropriate communication and hand-off processes should be in place.
- HMI must be based on Windows 10 or later, and support RDP or VNC communications.
- GE Cimplicity HMIs may require custom screen creation for remote usage.
- Each Remote Connection Broker can support up to 25 remote sessions.
- Remote Operations packages include 10 Yubikeys. Additional available.
- Firewall appliance sourced from Fortinet Corporation.
- Remote Connection Broker sourced from Xona Corporation.

#### Network Architecture

The recommended architecture incorporates the Remote Connection Broker as a hardened jump server with VNC access plus a GE-supplied secure firewall to create a dedicated network connection spanning the control zone, DMZ, and VPN access to remote users. Updates and maintenance of the system can be conducted through a standard web browser using MFA.

#### Standard Solution Architecture

![Diagram of Remote Operations Architecture](image)

- Client: Laptop, Server, Mobile
- Offsite VPN Access
- Dedicated DMZ
- Remote Connection Broker
- Control Room
- Onsite Users
- Mobile
- Router
- HMI
- HMI
- HMI
- HMI Server
- Controllers
- DCS
- MarkView
- Any

- Secure DMZ
- Firewall appliance sourced from Fortinet Corporation