

PredictPulse network technical description

This technical description explains the Eaton PredictPulse™ network requirements and architecture to help users better understand how it works, what is being monitored and delivered, and how to install this subscription service. A more detailed technical specification (TD161004EN) and related information can be found at Eaton.com/predictpulse.

Questions? Call 800-843-9433 option 2, then 5, or email predictpulseoperations@eaton.com.

Minimum requirements for PredictPulse on an Eaton UPS

1. Connectivity card connected and configured on the end user's LAN/WAN to mail server a. IP address
 - b. Subnet mask
 - c. Gateway
 - d. Mail server address (mail server name requires DNS)
2. Environmental monitoring probe (EMP) plugged into connectivity card to provide temperature and humidity data near battery (or UPS)
3. Latest connectivity card firmware available from eaton.com installed
4. Simple Mail Transport Protocol (SMTP)-compatible mail server capable of relaying SMTP messages
5. Network Ethernet connection to connectivity drop
6. SMTP relay/open relay
7. Port 25 (default) or port 587 (TLS) based on connectivity card
8. Complete activation via PredictPulse wizard installer or connectivity card

End user architecture

Connectivity card

The connectivity card is attached to the UPS and EMP in order to record and send out parametric (device health) and event data.

Email server

The connectivity card is designed to send the status and event emails through the end user's corporate email server. The connectivity card uses SMTP to communicate with Eaton's remote monitoring servers. This protocol was chosen for three reasons: reliability, pervasiveness and accessibility.

- Since the only requirement for delivery is to hand off to a proper email server, the transport is reliable. The email servers and network between them are responsible for delivering the email. The inherent architecture of the internet allows the message to be routed and re-routed, sent and re-sent, as needed until the intended recipient receives the message.
- The pervasiveness of the SMTP protocol is another reason that it is the preferred transport protocol. Almost every company in the world has some form of email service. This ensures that the company not only has the network set up to transfer emails, but also the expertise, internally or externally, to maintain the email service. This reduces the maintenance and complexity of using another, more obscure or proprietary, protocol.
- Thirdly, the SMTP protocol provides for accessibility. As long as a company can send email externally, corporate security does not have to change to allow the monitoring communication. Openings in firewalls, internal routing of emails and connectivity to the corporate email server are already set up for normal email traffic.

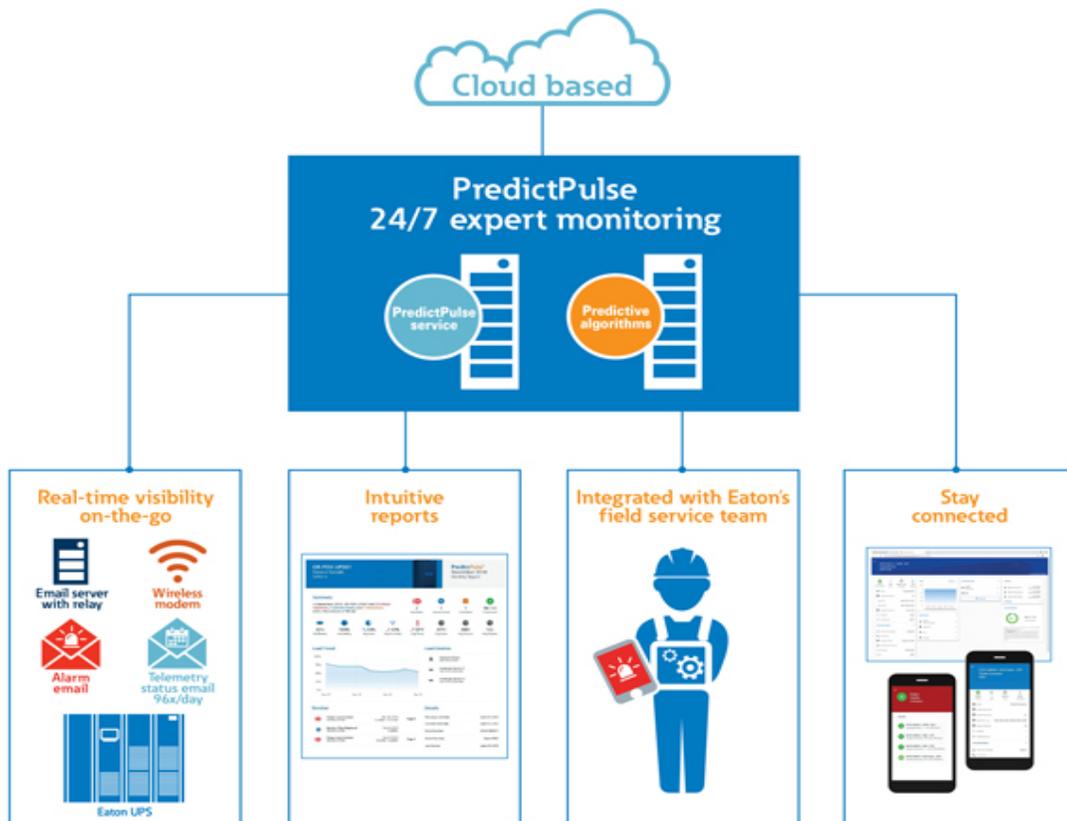
End user-internal emails

The connectivity card can be configured to send status and event emails directly to any internal email addresses. (The actual number of send-to email addresses allowed depends on the type of connectivity card.) Two recipient spaces are required for the PredictPulse monitoring service.

PredictPulse process

1. The Eaton connectivity card gathers data from the Eaton UPS and EMP.
2. The EMP provides temperature and humidity measurements and two contact closure terminals.
3. Parametric data is sent from the connectivity card either every 15 minutes or daily as an email CSV file attachment. (The time frame varies based on the type of connectivity card used.)
4. Alarm events are sent immediately through the connectivity card to the remote monitoring server.
5. Status and event emails may be sent directly to authorized end users and other monitoring systems, depending upon the connectivity card configuration.
6. The monitoring email is sent through the end user's email server. Once the Eaton remote monitoring servers receive the email, the data is stored in Eaton's database server, data is refreshed in the PredictPulse dashboard and alarms are pushed to the mobile app.
7. Appropriate notifications are then sent to the customer support specialist and the end user.
8. End users have immediate access to data on their dashboard (via Eaton's portal at <https://predictpulseapp.eaton.com/>) and mobile app.
9. Reports are also generated by the remote monitoring servers and delivered to the end user via email every first day of each month.

PredictPulse service architecture



Common issues

1. SMTP relay not enabled: The default on many mail servers is not to use SMTP relay. However, PredictPulse requires relay to be enabled to allow the UPS connectivity card to transmit the outgoing email IP address instead of any internal subnet.
2. Port not active on the switch
3. Recipient email authorization (e.g., SMTP from address)
4. Connectivity card not configured properly
5. Connectivity card password not available or known to activate PredictPulse
6. Email not working in general
7. Not completing the activation setup, clicking link from email and creating a unique password for your PredictPulse dashboard

Definitions

1. **SMTP:** Simple Mail Transfer Protocol is an internet standard for email transmission. It's a connection oriented, text-based protocol in which a mail sender communicates with a mail receiver by issuing command strings and supplying necessary data over a reliable ordered data stream channel—typically a Transmission Control Protocol (TCP) connection. SMTP works best when the sending and receiving machines are connected to the network all the time, using a store and forward mechanism (push technology).
2. **SMTP relay:** Although email servers and other mail transfer agents use SMTP to send and receive mail messages, user-level client mail applications typically use SMTP only for sending messages to a mail server for relaying.
 - a. The initiating host, the SMTP client, can be an end user's email client, functionally identified as a mail user agent (MUA), or a relay server's mail transfer agent (MTA), an SMTP server acting as an SMTP client in the relevant session, to relay mail. Fully capable SMTP servers maintain queues of messages for retrying message transmissions that resulted in transient failures.
 - b. A MUA knows the outgoing mail SMTP server from its configuration. An SMTP server acting as the client, i.e., relaying, typically determines which SMTP server to connect to by looking up the MX (Mail eXchange) DNS resource record for each recipient's domain name. Conforming MTAs (not all) fall back to a simple A record in case no MX record can be found. Relaying servers can also be configured to use a smart host.
 - c. An SMTP server acting as a client initiates a TCP connection to the server on the "well-known port" designated for SMTP—port 25. MUAs should use port 587 to connect to an MSA. The main difference between an MTA and an MSA is that SMTP authentication is mandatory for the latter only.
3. **MUA:** Mail user agent
4. **MX:** Mail eXchange
5. **MTA:** Mail transfer agent
6. **MSA:** Mail submission agent or mail server
7. **TLS:** Transport layer security
8. **LAN/WAN:** A local area network (LAN) is a computer network that connects computers within a limited area, such as a residence, school, laboratory or office building. A wide area network (WAN) covers a larger geographic distance and may involve leased telecommunication circuits. The media for LANs are locally managed.
9. **Port 25:** SMTP by default uses TCP port 25.
10. **Port 587 (TLS):** The protocol for mail submission is the same but uses port 587.
11. **Connectivity card:** Eaton cards that plug into Eaton UPSs to transmit data via protocols like SMTP, MODBUS, SNMP, etc.
12. **EMP:** Environmental monitoring probe to collect temperature and humidity data.
13. **Mail server (SMTP compatible):** Mail submission agent