

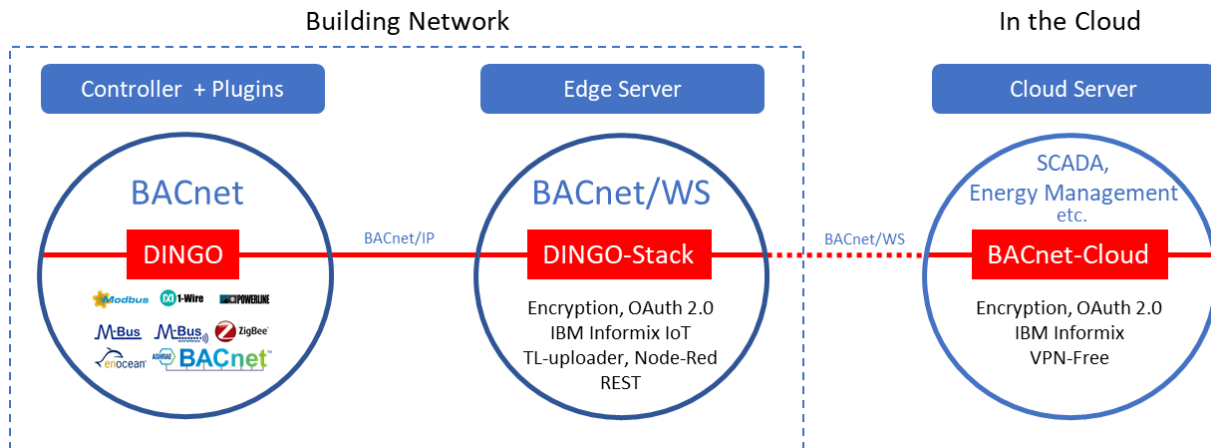
Industry Challenges

- Today multiple incompatible protocols are used for Building Automation, including Modbus, M-Bus, enOcean, KNX, BACnet etc.
- Costly and time-consuming configuration work.
- Communicating sensor and actuator to the Cloud has security risks and lacks standardization.

Current solutions

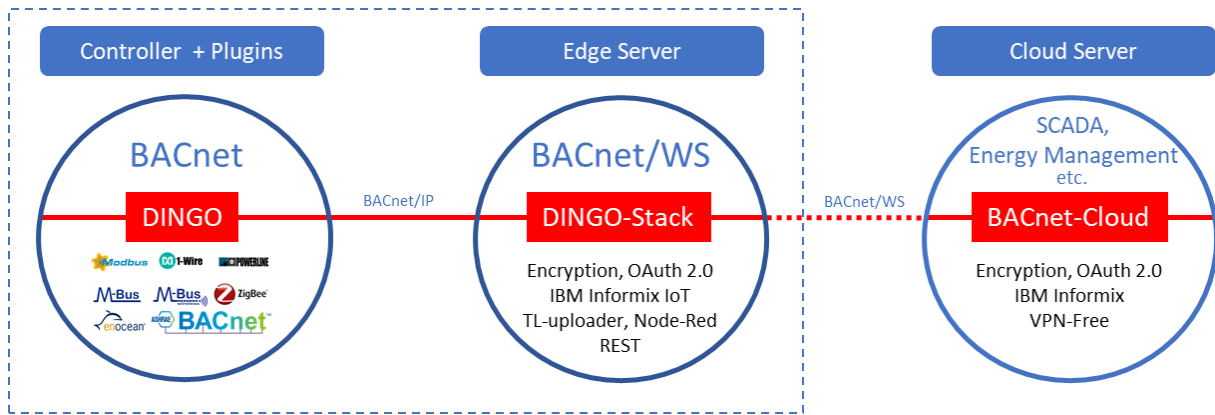
- Multiple gateways to map different communication protocols back and forth.
- Proprietary solutions, locking customers in with the solution vendor.
- VPN to solve cloud security.
- In-building protocol differs from cloud-protocol, resulting in a massive complex configuration work.
- Cloud communication only subsets in-building BACnet communication. An example is MQTT.

Our solution



- None-BACnet protocols gatewayed to BACnet in one device by software. After that all devices seen as BACnet-devices. **Any vendor that supports BACnet, is also 100% supported by the solution.**
- Open none-proprietary communication from sensor/actuator to/from Cloud by the widely accepted BACnet plus BACnet/WS standard.
- Automated configuration using templates and sensor-criteria. Saves lot of configuration cost and maintenance.
- Using BACnet/WS for Cloud communication is secure and homogenous with the in-building BACnet communication.
- Cloud security with encryption and OAuth 2.0 authentication, equivalent or better than VPN.
- Scalable from few sensors/actuators in-building to thousands by the Edge Server, using small footprint hardware and database to powerful multi-core servers running world leader IBM Informix IoT database.
- BACnet/WS enables moving software components from the Cloud to Edge Server and vice versa.
- Widely used, in-building, BACnet enabled software systems as SCADA, Energy Management, etc. can be installed in the Cloud. Auto-configured Shadow-BACnet-Objects in BACnet-Cloud, that shadow, appear as real-time physical BACnet-Objects imitating the ones in the buildings.
- BACnet-Cloud is one huge virtual BACnet-network representing all its connected BACnet Buildings. This cloud-enables software development/configuration like SCADA, Node-Red, etc.
- IBM Informix time-series enable large, fast, but small footprint BACnet trend-log objects. Derivative trend-logs calculated from other trend-logs are easy to configure.





<p>Hardware (DINGO):</p> <ul style="list-style-type: none"> • RPi-COM or RPi-Zero Computer Board • User Interface Board • Plug-in M-Bus • Plug-in wM-Bus • Plug-in enOCean • Plug-in PINGO 	<p>Hardware:</p> <ul style="list-style-type: none"> • DINGO Backbone (RPI based) • DINGO Plug-in 2G/3G • DINGO Plug-in NB-IoT • Raspberry Pi 3B • Any other Linux Debian platform <ul style="list-style-type: none"> ✓ Intel Nuc or x86 ✓ Etc. 	<p>Hardware:</p> <ul style="list-style-type: none"> • Recommended multi-core Intel x86 platform running Ubuntu Server. • Any other Linux Debian based platform capable running IBM Informix Server.
<p>Software (DINGO-Stack):</p> <ul style="list-style-type: none"> • BACnet/IP Server • Plug-in Modbus • Plug-in 1-Wire • Plug-in M-Bus • Plug-in wM-Bus • Plug-in enOCean • Plug-in PINGO 	<p>Software (DINGO-stack):</p> <ul style="list-style-type: none"> • BACnet/IP (Server) & Client • BACnet/WS • TL Uploader • Optional, BACnet to IBM Watson IoT Platform Gateway 	<p>Software (Go-IoT Cloud):</p> <ul style="list-style-type: none"> • BACnet-Cloud Includes BACnet shadowing and derivate Trend Log Objects. Also, DINGO-Manager for fast auto-configuration.
<p>Software other:</p> <ul style="list-style-type: none"> • Optional Node-RED 	<p>Software other:</p> <ul style="list-style-type: none"> • IBM Informix for large installations only • Optional Node-RED 	<p>Software other:</p> <ul style="list-style-type: none"> • IBM Informix • Optional Node-RED

