

IoT Gateway Design Proposal

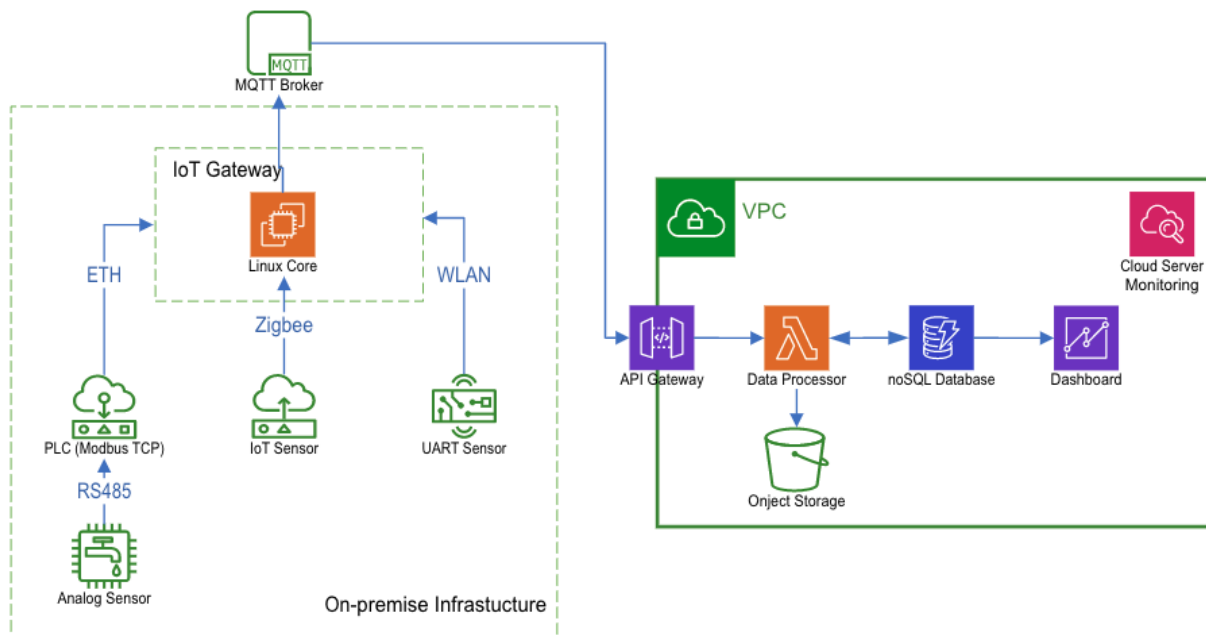
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Summary of the Proposal

Prompt: Design a solution for a system to build an IoT gateway which can collect various types of analog and digital sensor data as well as UART based sensor data, IoT gateway should be able to communicate with cloud platform over Ethernet or Wi-Fi interface, IoT gateway should be running Linux distributed system. IoT gateway should support OTA, self-memory management. IoT gateway should send health statistical data to the cloud periodically.

Block Diagram

The block diagram below explains a high-level system architecture of the IoT gateway aggregating three different sets of sensors and pushing the data to a cloud server for monitoring purposes. At this stage, the control system is not in place.



Hardware Requirement

The hardware is specifies based on the industrial standard for ruggedized IIoT gateway. Which runs on Linux distributed system with Zigbee local mesh as the wireless communication protocol.

Communication	
Wireless Comm. Protocol	Zigbee (Local Mesh)
Bands	LTE Cat 4: B1, B2, B3, B4, B5, B7, B8, B12, B13, B18, B19, B20, B25, B26, B28, B38, B39, B40, B41

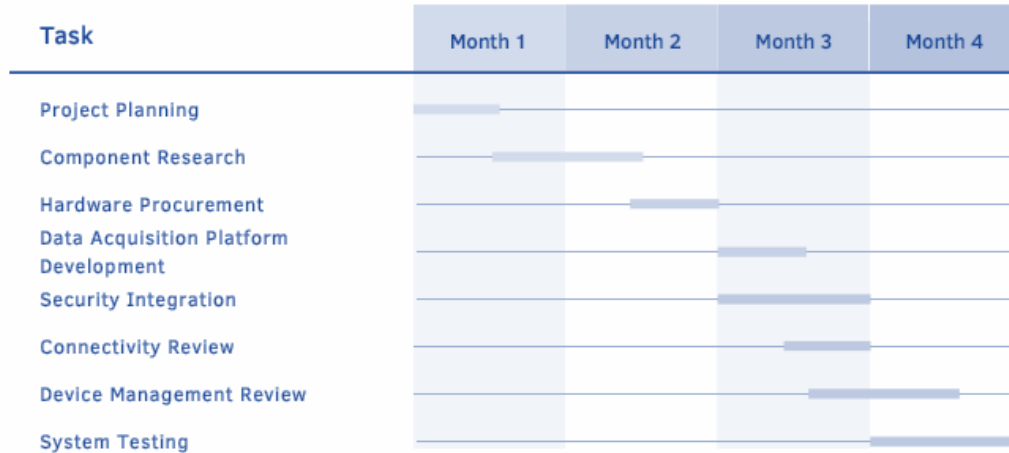
	3G: B1, B2, B4, B5, B6, B8, B19 2G EDGE / GPRS: 850 / 900 / 1800 / 1900 MHz
Connectors	(2) 50 Ω SMA (center pin: female)
SIM Slots	(2) Mini-SIM (2FF)
SIM Security	Behind SIM cover, secured with screw
Software Management	
Operating System	Linux Distributed System (Debian/Red Hat)
Remote Management	SNMP v2/v3, SSH
Local management	WebUI (HTTP/HTTPS); CLI (Telnet, SSH)
Management / Troubleshooting Tools	FTP client, SCP; protocol analyzer with PCAP for Wireshark; event logging with syslog and SMTP client; NTP/SNTP; Nagios, Intelliflow, iPerf, Dynamic DNS, ping, traceroute
Ethernet	
Port	(1) RJ-45; 10/100 Mbps (auto-sensing)
Serial	
Port	(1) RJ-45 10-pin (10P10C); RS-232/485; software selectable - RS-232 DTE (RXD, TXD, RTS, CTS, DTR, DCD, DSR, RI) - RS-485 (TX/RX+; RX/TX-); half-duplex
Environmental	
Operating Condition	-40° C to 75° C @ 5% to 95% RH

Software Support

ENTERPRISE SOFTWARE	Description
Protocol Support	HTTPS, FTP client, SSL, TLS v1.2, SCP (client and server), SFTP, SMTP client for use by scripts and the command line, SNMP (v2/v3), SSH; protocol analyzer, ability to capture PCAP for use with Wireshark; DynDNS; dynamic DNS client compatible with BIND9/No-IP/DynDNS; captive portal, Intelliflow; Nagios, DNS server, NTP server, multicast, mDNS, iPerf
Security	IP filtering, stateful firewall, custom firewall rules (iptables), address and port translation; TLS 1.2 and above, OpenVPN client and server; VPN tunnels; authentication: RADIUS, TACACS+; certificates; MAC address filtering; VLAN support
VPN	IPSec with IKEv1, IKEv2, NAT Traversal; OpenVPN client and server; GRE PN tunnels; cryptology: SHA-1/256/384/512, MD5, RSA; encryption: 3DES and AES up to 256-bit (CBC mode for IPsec); Diffie Hellman: DH groups 1-32 (CURVE448)
Routing/Failover	IP pass-through; NAT, NAT with IP port forwarding; GRE; multicast routing; routing protocols: RIP (v1, v2) OSPF, BGP; IP failover: VRRP; automatic failover.
Other Protocol	DHCP; dynamic DNS client compatible with No-IP/DynDNS

Project Timeline

The project timeline below explains the overall timeline from project planning to system testing just before system deployment. The hardware procurement timeline is shortened assuming local suppliers keep the unit in stocks.



Component Selection Matrix

The component selection matrix below should guide the selection of goods based on the required specification scored based on the degree of importance (low, medium, high).

Type of hardware	Weight	Alternative A	Alternative B	Alternative C
General Performance				
Ease to Implement	1			
Benefit/Cost relationship	2			
Leadtime	2			
Manufacturer Portfolio	1			
Technical Performance				
Communication Interface	3			
Software Management	2			
OTA support	2			
Development Environment	1			
Total Rating				

Scoring:

1. Low
2. Medium
3. High