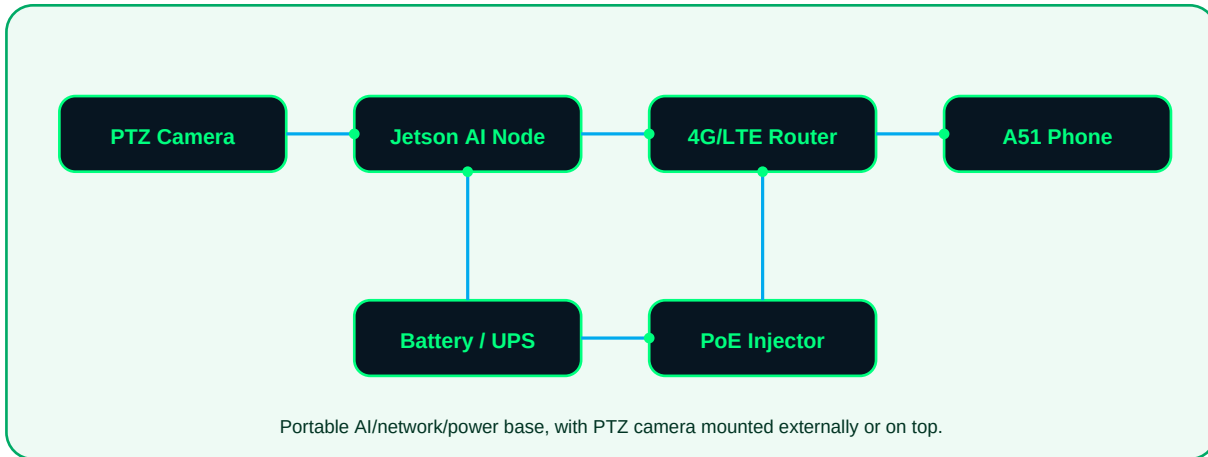


Portable AI PTZ Security Camera Node

Concept notes from the Security Monitor roadmap discussion: Samsung A51 mobile operator node, Reolink PTZ PoE camera, Jetson AI node, 4G/LTE remote streaming, and minimum portable system dimensions.



1. Executive Summary

The portable AI PTZ Security Camera Node is a compact field-ready security system built around a PTZ PoE camera, Jetson AI compute node, 4G/LTE router, PoE power, and a battery/UPS. The Samsung A51 acts as a mobile operator terminal for alerts, GPS check-ins, remote viewing, camera inspection, and later approval workflows.

The smallest practical base-case target is about 40 x 30 x 20 cm, excluding the external PTZ camera mount. With the PTZ camera mounted on top, the total operating height becomes approximately 40-45 cm.

2. Samsung A51 as Mobile Operator Node

The Samsung A51 can be connected to the Security Monitor as a portable security endpoint rather than only a phone. It can provide operator location, Bluetooth bridging, alerts, manual approval, phone health status, and dual camera streaming.

Module	Possibility	Dashboard value
GPS / operator location	Phone sends GPS position and battery state to the server	Shows operator on-site, last known location, movement, and emergency context
Bluetooth bridge	A51 detects the Da Fit watch and other BLE tags	Known wearable present/missing, signal strength, last seen time
Mobile camera	A51 camera used as an inspection stream or incident snapshot source	Rack inspection, cable checks, QR/device label scan, proof capture
Alerts	Telegram, email, web push, or later custom Android app	Receives high-risk IP, PTZ offline, unknown LAN device, and Jetson warnings
Approval device	A51 confirms dangerous actions	Approve ban/unban, unknown device approval, camera disable, firewall change
Phone health monitor	Dashboard tracks A51 status	Battery, Wi-Fi, Bluetooth, GPS, Android state, last heartbeat

Suggested module tree

Security Monitor - IP Intelligence - Ban Candidate Queue - Device Integrity Monitor - Camera / PTZ Monitor - Bluetooth Wearable Presence - Mobile Operator Node - Samsung A51 status - GPS location - Battery - BLE scan bridge - Alert receiver - Approval device

3. Da Fit Health Watch Integration

The Da Fit Bluetooth health watch should not be treated as a true GPS tracker by itself. The realistic use is BLE presence detection. The watch can identify that the operator is nearby, while the A51 provides the bridge to the dashboard and, if needed, the phone GPS location.

Signal	Meaning
Watch Bluetooth seen	Operator or wearable is nearby
Watch disappeared	Operator or wearable left the zone
RSSI signal strength	Rough proximity estimate
Last seen time	Useful security and audit timestamp

4. Phase 6 - Mobile Dual Camera Bridge

Phase 6 adds two video directions: the Samsung A51 camera streams to the Security Monitor, and the AI R&D; PTZ camera stream is viewable on the A51. This turns the A51 into a mobile security operator terminal.

A51 phone camera -> Security Monitor dashboard -> operator / archive / incident panel
AI R&D; Node PTZ camera -> Jetson / dashboard stream -> Samsung A51 phone viewer

Subphase	Purpose
6A - A51 mobile camera feed	Mobile inspection camera to Security Monitor
6B - PTZ stream to A51	Phone becomes remote viewer for PTZ camera
6C - Mobile operator camera card	Dashboard card for phone stream and device status
6D - Phone PTZ viewer page	Mobile page with live feed and PTZ controls
6E - Secure access / token protection	No public unauthenticated camera stream
6F - Optional recording / incident snapshot	Record or snapshot only when needed

5. Phase 7 - 4G/LTE Remote Streaming Bridge

Phase 7 makes the portable AI PTZ Security Node viewable from the Samsung A51 anywhere, not only on local Wi-Fi. The preferred architecture is a PTZ camera and Jetson connected to a 4G/LTE router, with a secure tunnel or HTTPS viewer exposed only to the operator.

AI PTZ Camera -> Jetson / AI R&D; Node -> 4G/LTE router or phone hotspot -> Secure tunnel / HTTPS -> Samsung A51 operator viewer

Subphase	Purpose
7A - Portable 4G/LTE router mode	Camera node works on temporary site, delivery, field, or client location

7B - A51 remote PTZ viewer	Phone opens protected viewer page from anywhere
7C - Secure tunnel / HTTPS access	WireGuard, Tailscale, ZeroTier, Cloudflare Tunnel, or authenticated reverse proxy
7D - LTE signal + data usage monitor	Dashboard tracks carrier, signal, latency, data use, heartbeat, stream status
7E - Adaptive stream fallback	Reduce quality or use snapshots when signal is weak

6. Streaming Distance Expectations

Scenario	Realistic distance / range	Notes
Same Wi-Fi network	5-15 m same room; 10-25 m with one wall; 30-80 m outdoor line-of-sight	Best local setup. Phone only needs to be on the same network.
Direct Wi-Fi hotspot from node	10-20 m same room; 5-15 m through walls; 30-50 m outdoor line-of-sight	Good for portable field setup but weaker than a real router.
Bluetooth	Not suitable for video	Fine for watch presence, BLE tags, battery/status, sensor data.
Internet / 4G / 5G remote streaming	Unlimited practical distance if both sides have internet	Must be protected with VPN, HTTPS, login/token, and no open public stream.

7. Hardware Architecture

The compact design should avoid a large 8-port PoE switch for the smallest version. For one PTZ camera, use a single-port PoE+ injector or compact PoE+ module instead. This leaves more space for the battery, ventilation, cable strain relief, and service access.

Recommended compact architecture

Reolink PTZ PoE camera -> single-port PoE+ injector or tiny PoE+ switch -> Jetson AI node -> 4G/LTE router -> Samsung A51 remote viewer -> battery / DC UPS

Component	Role / note
Reolink PTZ PoE camera	Physical event investigation, operator view, future AI-assisted detection
Jetson AI node	AI processing, camera stream handling, event detection, dashboard feed
4G/LTE router	Remote network bridge for Phase 7 streaming
PoE injector / compact PoE+ switch	Power and network for the PTZ camera
Battery / UPS	Portable operation and controlled shutdown
Samsung A51	Mobile operator viewer, alerts, GPS, approvals, camera bridge
Da Fit watch	BLE presence indicator through the A51

8. Smallest Portable System Dimension

For a system using a Reolink PTZ PoE camera, Jetson AI node, 4G/LTE router, compact PoE power, and battery/UPS, the smallest realistic portable base case is approximately 40 x 30 x 18-22 cm. The clean product target should be 40 x 30 x 20 cm.

Build type	Approximate dimensions	Use case
Ultra-compact prototype	35 x 25 x 18 cm	Possible but tight; heat and cable management become annoying.

Practical portable product case	40 x 30 x 20 cm	Best balance for Systems Studio prototype/product.
Rugged client-ready case	45 x 35 x 22-25 cm	Better for battery, ventilation, waterproof connectors, strain relief, and service access.

Important design rule: do not operate the PTZ camera inside a closed box. Use the box as the portable AI/network/power base, and mount the PTZ camera on top, on a tripod, or on a small pole.

[PTZ camera mounted on top / tripod / pole] | PoE cable | [40 x 30 x 20 cm portable AI security node case] Jetson + LTE router + PoE injector + battery + fan

Final website-friendly specification

Smallest practical system dimension: +/- 40 x 30 x 20 cm portable base case, excluding external PTZ camera mount.
With camera mounted on top: +/- 40 x 30 x 40-45 cm total operating height.

9. Security Requirements

Requirement	Reason
HTTPS everywhere	Protect dashboard and camera control traffic
VPN or private tunnel	Avoid exposing camera streams directly to the public internet
Token or login protection	Prevent unauthorised viewer access
Emergency stream-off button	Operator can instantly stop mobile or PTZ video stream
LAN-only mode where possible	Safer local operation for client/NDA environments
Adaptive fallback	Keep evidence when 4G is weak by reducing quality or taking snapshots

10. Roadmap Summary

Phase 1 - Telegram alerts to A51. Phase 2 - A51 sends GPS and battery to Security Monitor. Phase 3 - A51 becomes BLE bridge for Da Fit watch and tags. Phase 4 - A51 becomes approval device for security actions. Phase 5 - A51 camera uploads inspection photos to events. Phase 6 - Mobile Dual Camera Bridge: A51 camera to dashboard and PTZ stream to phone. Phase 7 - 4G/LTE Remote Streaming Bridge: remote PTZ viewing over mobile network.

Prepared for Systems Studio - portable AI PTZ Security Camera Node concept notes.