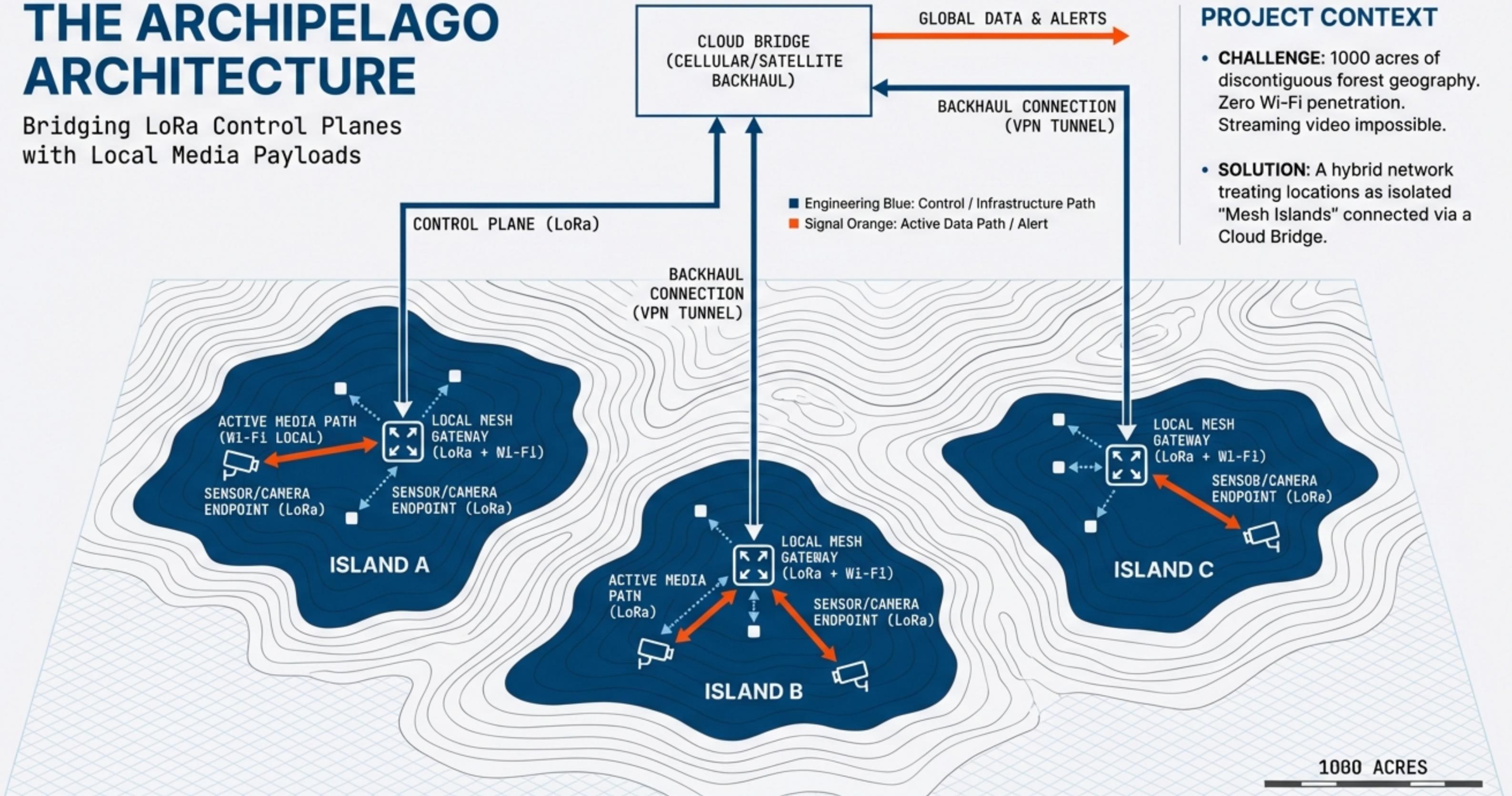


THE ARCHIPELAGO ARCHITECTURE

Bridging LoRa Control Planes with Local Media Payloads

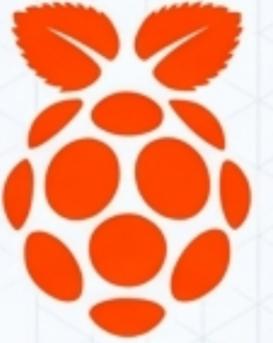


PROJECT CONTEXT

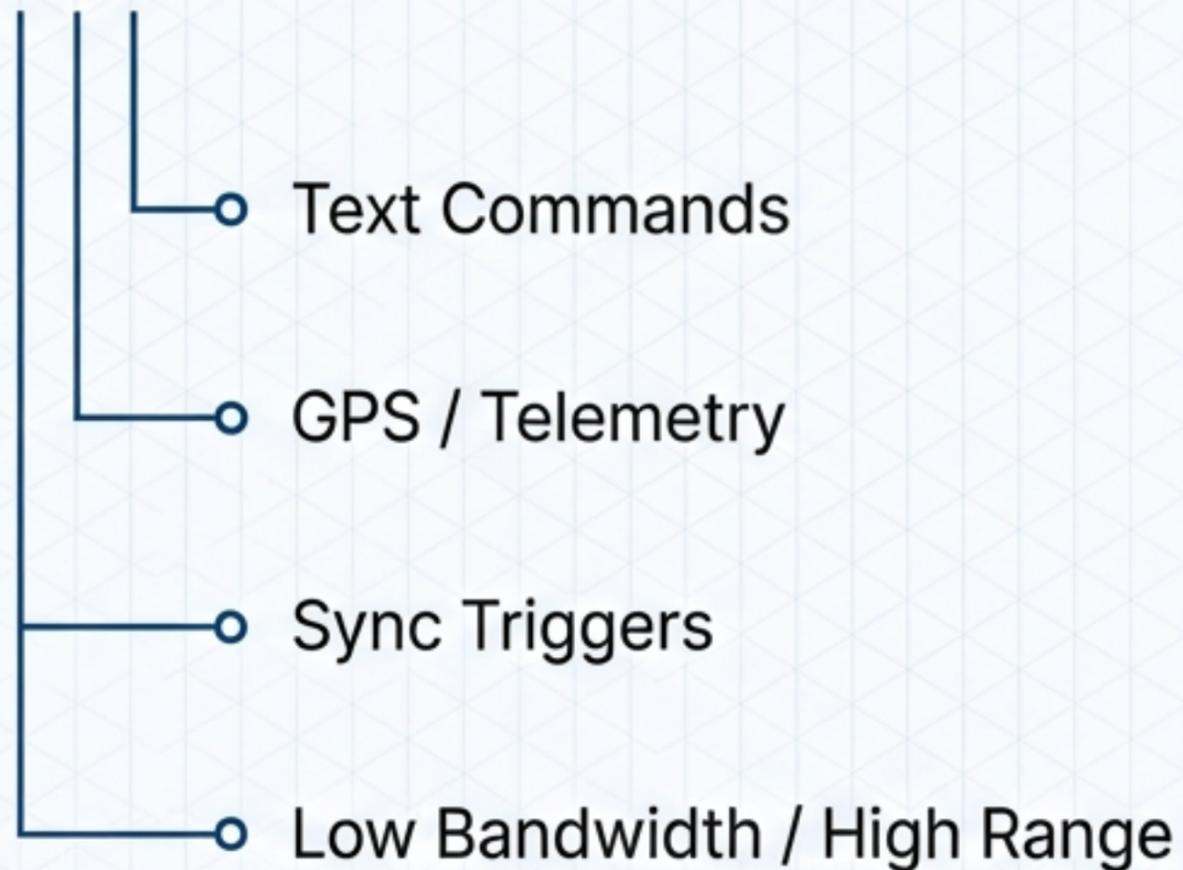
- **CHALLENGE:** 1000 acres of discontinuous forest geography. Zero Wi-Fi penetration. Streaming video impossible.
- **SOLUTION:** A hybrid network treating locations as isolated "Mesh Islands" connected via a Cloud Bridge.



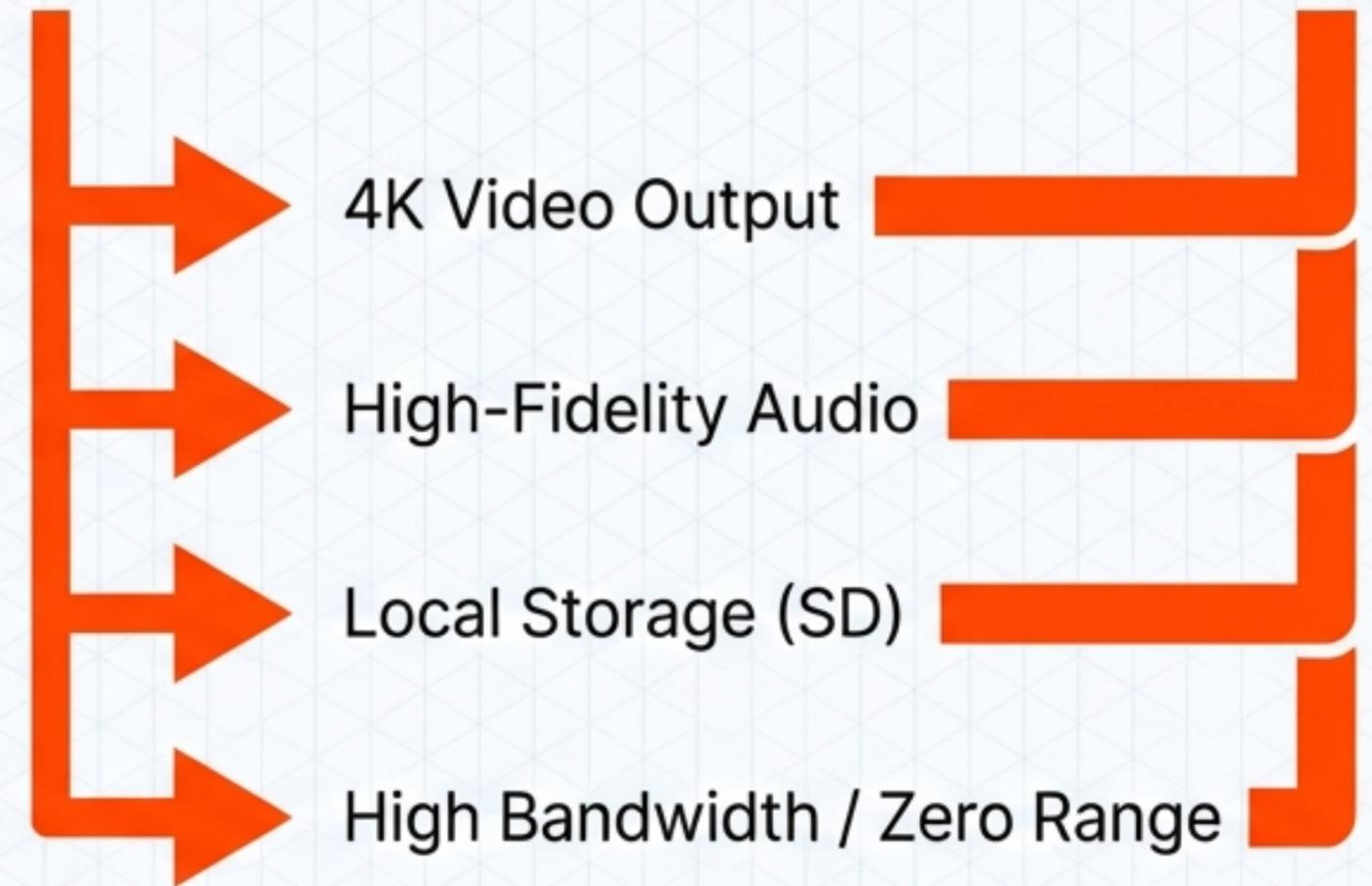
DECOUPLING SIGNAL FROM CONTENT



CONTROL PLANE

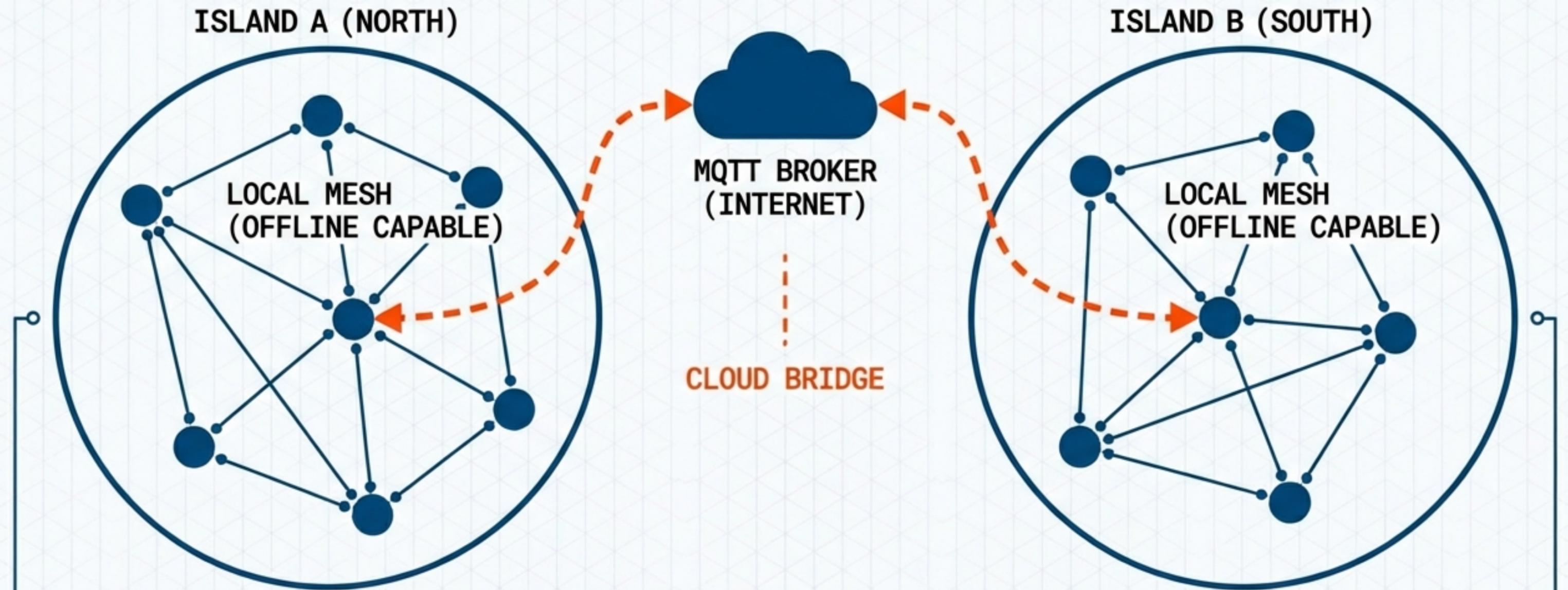


MEDIA PLANE



STRATEGY: The signal triggers the content; the network never carries the video. Zero congestion.

INTRA-ISLAND MESH VS. INTER-ISLAND BRIDGE



Local Mesh (915MHz LoRa):
Functions autonomously without internet.
Connects staff and local props.

Cloud Bridge (MQTT):
Bridges traffic between islands. Allows cues
from Location A to trigger events at Location B.

The Source: Portable Command Injection

ROLE:

The Trigger.
Wearable input device
for Stage Managers.

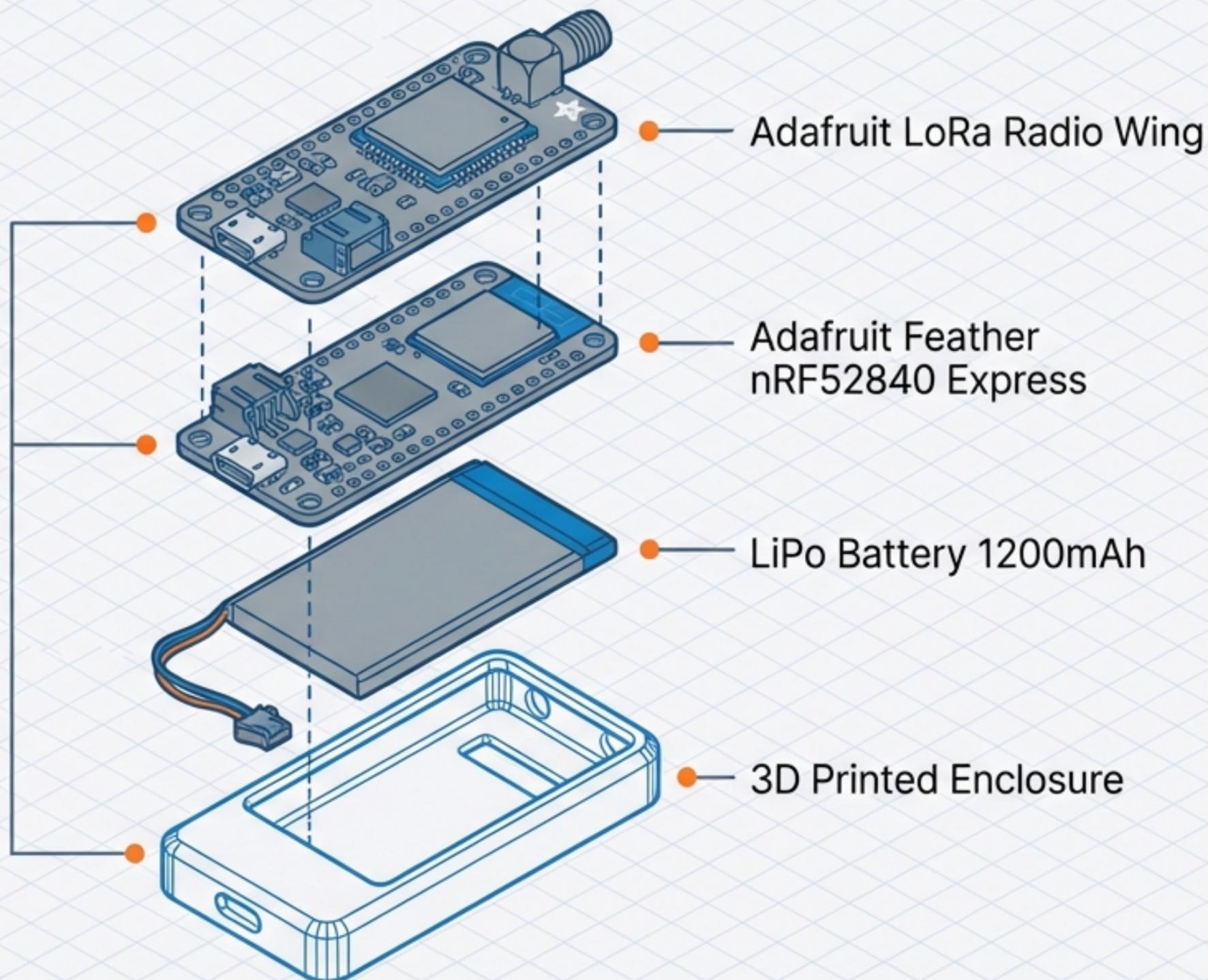
CHANNEL:

MEDIA_CUES (High
Reliability Settings).

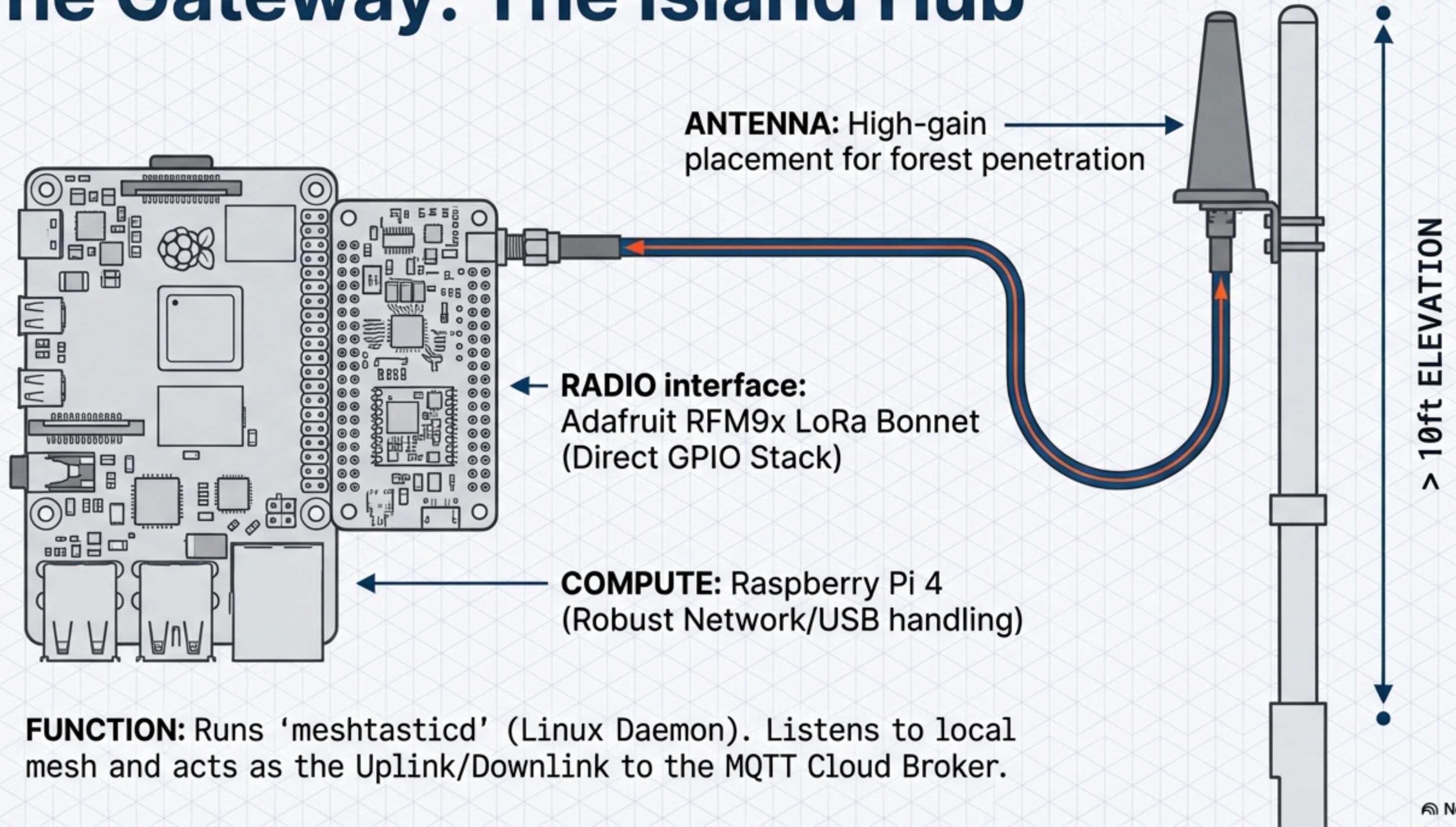
POWER:

Battery operated,
native Meshtastic
support.

Exploded View



The Gateway: The Island Hub



The Destination: Local Media Execution

The Store-and-Trigger Workflow

1. MONITOR

Device listens for string
'cue:lighting_storm'

2. PARSE

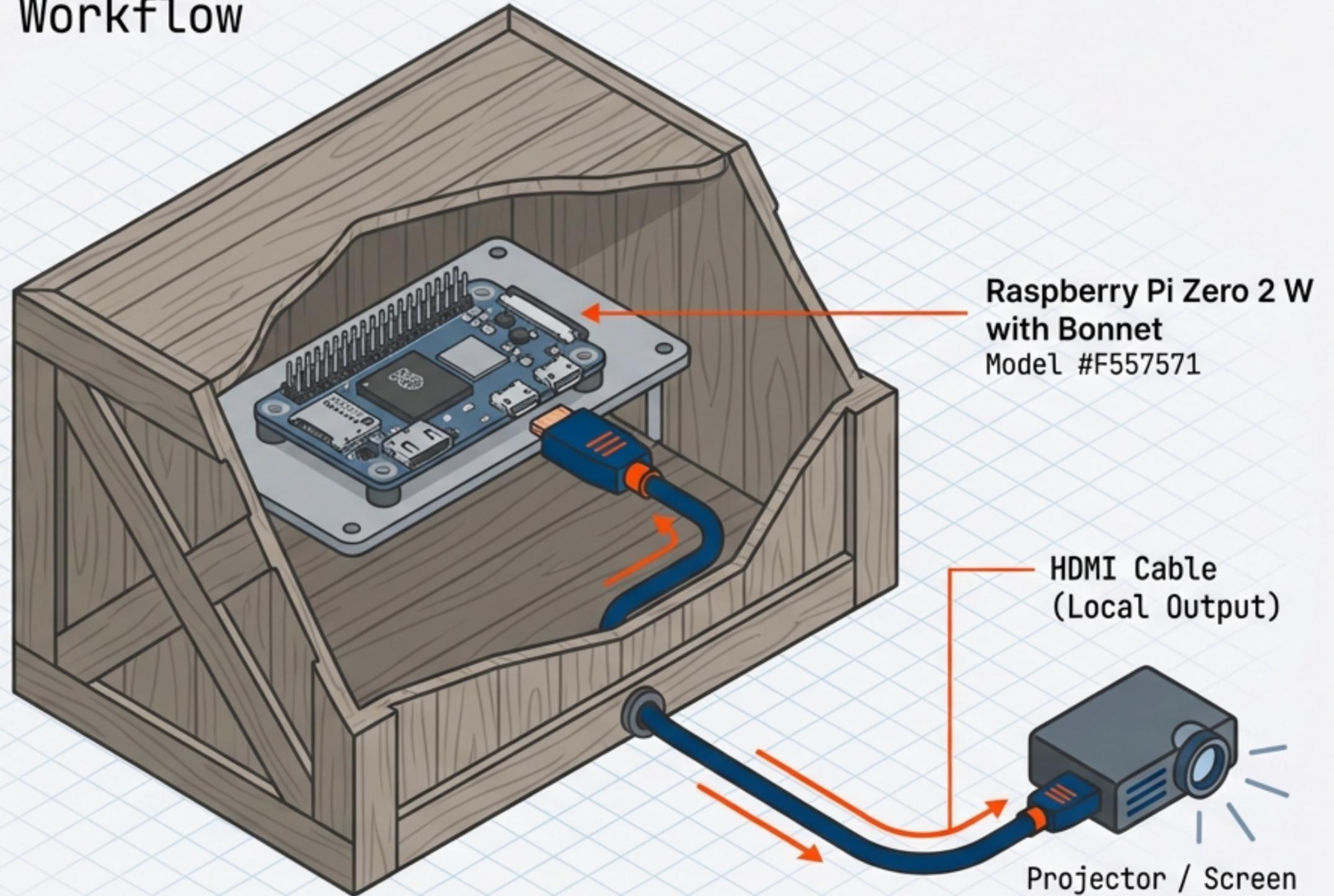
Matches string to
internal command list.

3. ACTION

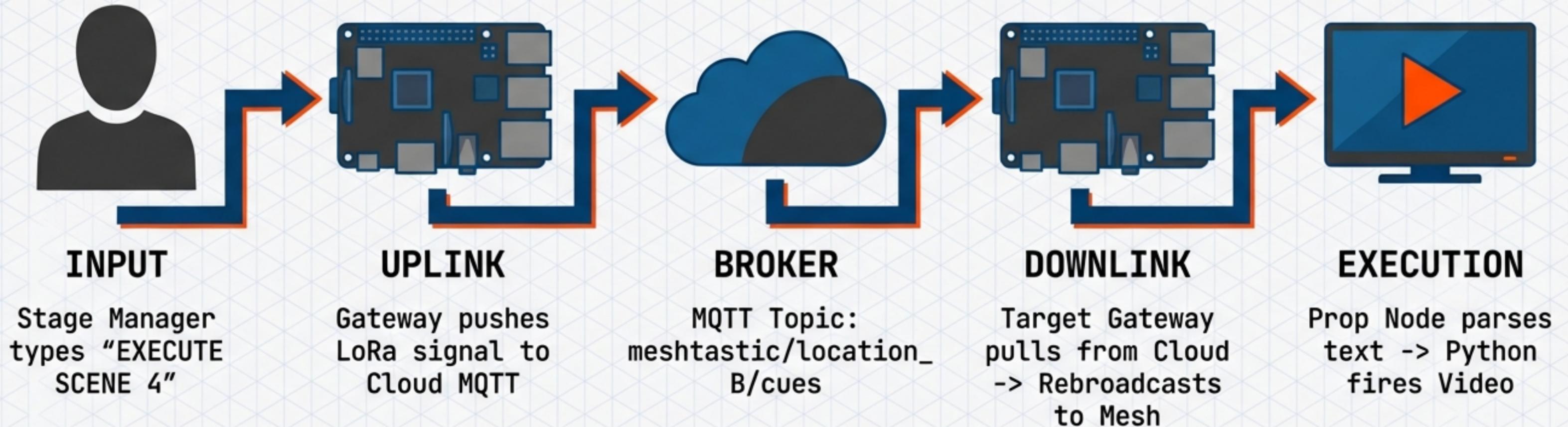
Python script triggers
local video file on SD card.

KEY INSIGHT:

Bypasses network
streaming entirely.
Instant playback, zero lag.

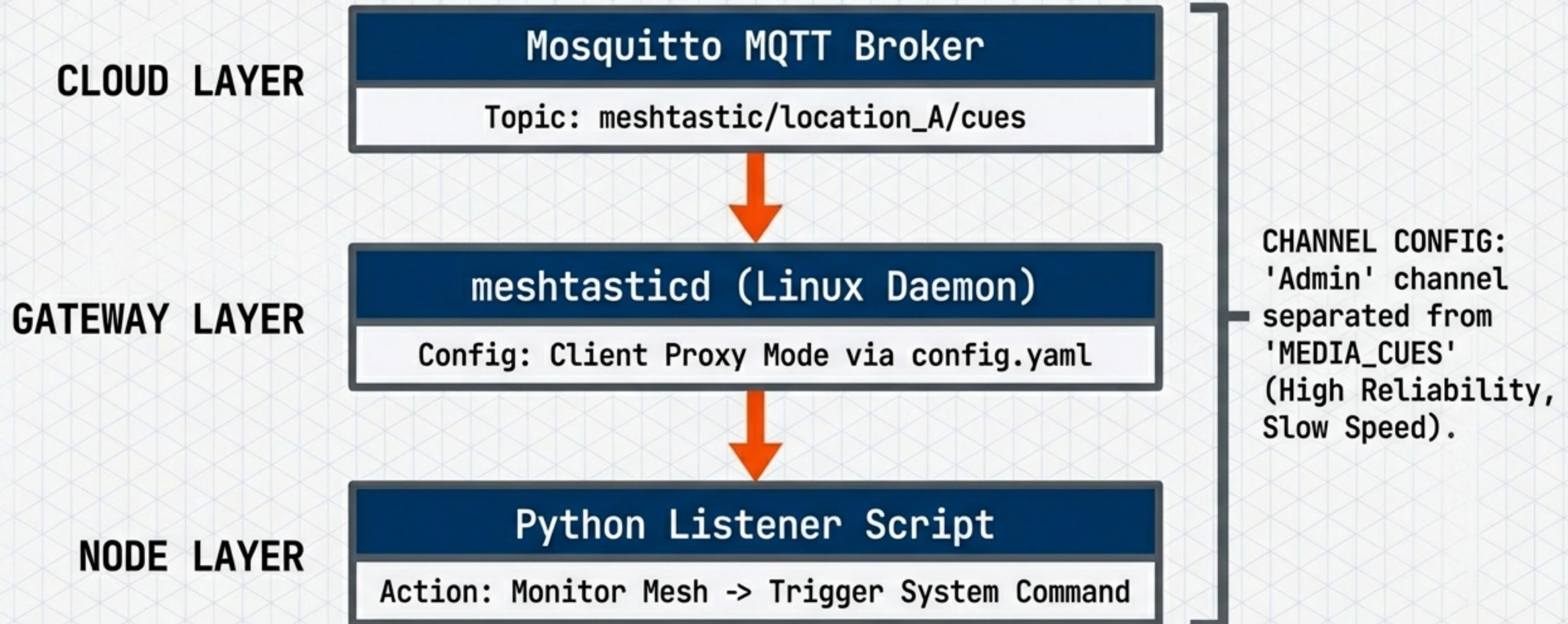


The Mixed Media Sync Protocol

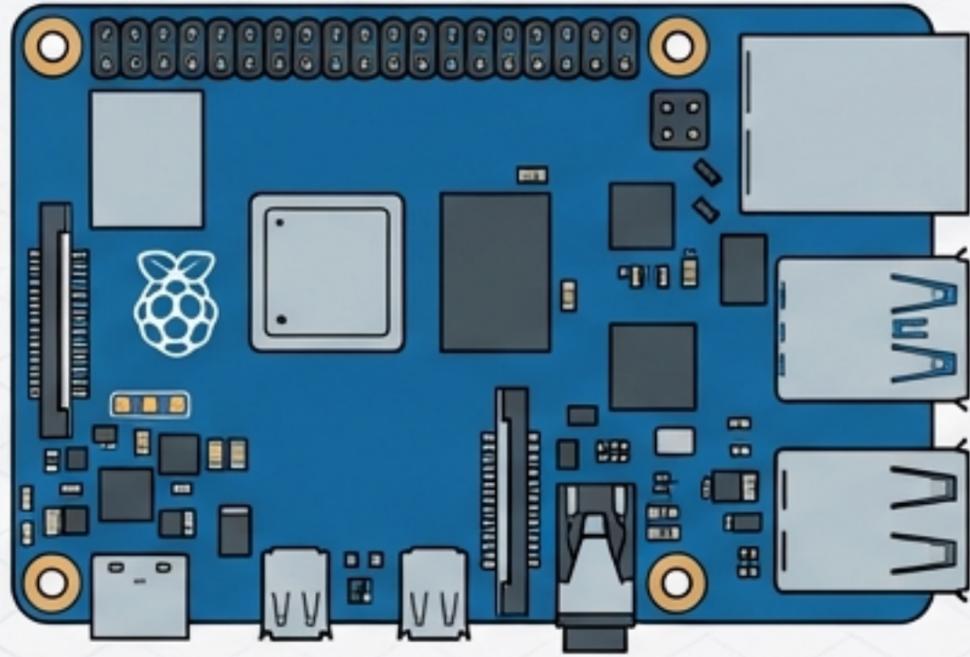


Staff see the text for coordination. Props see the text for action.

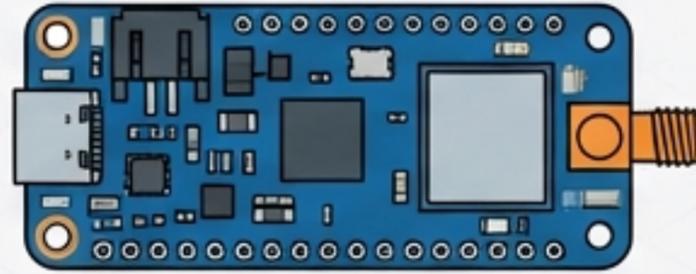
Software Configuration & The MQTT Glue



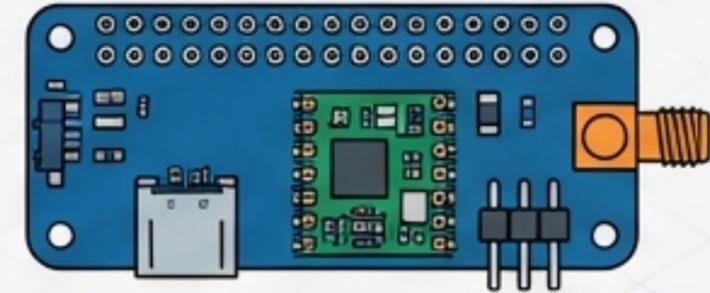
Bill of Materials



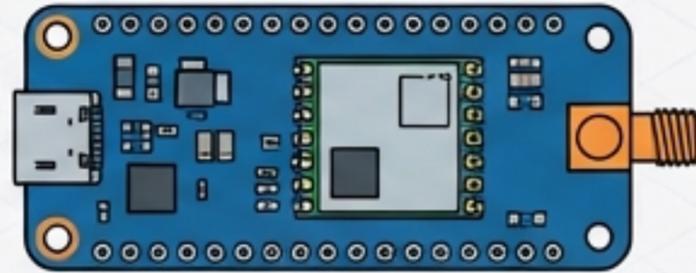
Raspberry Pi 4 Board



Adafruit Feather nRF52840



RFM95W LoRa Bonnet



LoRa Radio Wing



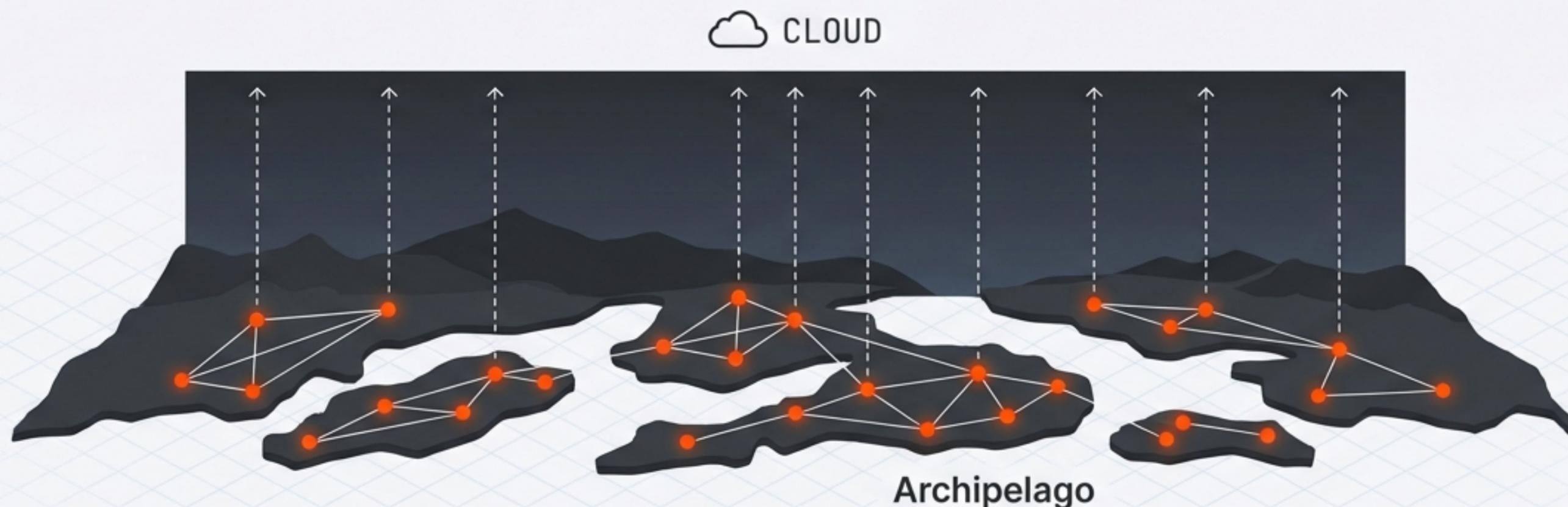
uFL Antenna Cable

DEVICE	COMPONENT	EST. COST
Gateway	Raspberry Pi 4 + Case + RFM95W Bonnet	~\$85
Staff Node	Feather nRF52840 + Radio Wing	~\$45
Accessory	900MHz uFL Antenna	~\$5

Modular hardware enables easy field repair and scalability without vendor lock-in.

Technical Field Manual meets Swiss Architectural Schematic

Robustness Through Decoupling



FAIL-SAFE

If the **Cloud** fails, local mesh continues for internal cues. Only the inter-site link is lost.

SCALABLE

Add "**Islands**" endlessly without degrading local mesh performance.

EFFICIENT

Respects **LoRa** bandwidth limits while delivering **high-res** media experiences via local processing.