UPES Emergency Communication System

IN AN EMERGENCY

111

the only number a student must know

A **LAN-only campus emergency & internal calling system** on Asterisk/FreePBX — runs over campus Wi-Fi with **no internet, no SIM, no cloud**, so it keeps working when normal networks are down. Deployable as a fixed campus install **or** a self-powered disaster-response van with corner repeaters. Every 111 call is recorded from the first second.

WHAT IT IS

Asterisk PBX in a QEMU Ubuntu VM on a Windows laptop; Android phones (Linphone) register as SIP softphones over the LAN. One-command installer stands up the whole stack + autostart.

IDENTITY MODEL

SAP ID = extension = username. Responder roles are **positions** (**4xxx**) staffed by shift — never a personal account. Same person + different job = same ID, different context.

WHY LAN-ONLY

Survives internet / cellular / cloud / PSTN failure — the point. **111 is human-first**; the offline coach (102) is the automatic fallback when no human answers. AI never gates 111.

THE SYSTEM IN ONE PICTURE

```
Android (Linphone) on Wi-Fi → AP → Switch/Router → Asterisk / FreePBX → Local storage (recordings · VM · CDR/CEL · incidents)
    dial 111 → ert_emergency_queue (press 1 → first-aid) → offline coach 102 if no answer point free
            ERT Lead 4101 + backup (Sec 4300 · Med 4200 · Warden) alerted in the background, in parallel — no dead-air
      ✕ no Internet   ✕ no Cellular   ✕ no Cloud   ✕ no PSTN  — excluded by design
```

EMERGENCY & SERVICE CODES

111	**Campus emergency hotline** — human-first, rings ERT queue, recorded
102	**Offline panic-coach** — deterministic first-aid, zero internet; auto fallback
101	Local-first AI triage (no cloud) — always escalates to 111; never dialed
199	Drill / test (no real dispatch) · **198** echo · **196** AI test
~~100~~	Deprecated & removed (softphones hijack it as "Police")

FEATURE CODES

***22 / *23**	Responder shift on / off (join / leave 111 queue)
***45 / *46**	Pause / resume within a shift
***77**	Silent SOS / duress → pages ERT zone (everyone)
***9 · *80<ext>**	Incident bridge → 9000 · intercom auto-answer (ERT/admin)
105 · 411	Request callback · dial-by-name directory
211–215	Dept hunt: Security / Medical / Warden / Ops / IT
720–723	Announce: evacuate / avoid / all-clear / assemble (ERT-Lead)

RESERVED RANGES & ZONES

SAP ID	Every real person — extension = username
4101 / 4110–19 / 4120	ERT Lead · ERT operators (answer queue) · Control Room
4200/4300/4400/4500/4600s	Medical · Security (4301 Lead) · Warden · Admin/Ops · IT — dispatch targets
4700s	Fixed devices — speakers, gate phones
700–799	Paging zones (700 all-campus = PIN); logged
9000–9099	Incident-command conf rooms (9000 recorded, PIN)

INSIDE THE PBX · DEPLOYMENT

Components: chan_pjsip (SIP) · dialplan/contexts (routing + least-privilege) · app_queue `ert_emergency_queue` · MixMonitor (recording) · voicemail · confbridge (9000s) · app_page (700s) · CDR/CEL · **upes_api** FastAPI `:8090`.

Modes: A — campus server (mains+UPS); B — self-powered van + corner repeaters (disaster / failover). Same config & numbers. HA option: 2× Jetson Nano active/standby (keepalived VIP).

ALSO IN THE BOX

- **Operations Console** `:8080` + two always-on **LED-TV wallboards** (safety / ops)
- **Shared CardDAV phonebook** — dial responders by name · stable name `upes-ecs.local` (mDNS)
- **Multi-language prompts** (Piper TTS): English + Hindi, Telugu, Malayalam, Urdu, Nepali · **missed-emergency follow-ups**

Call Flow, Roles, Status & Ops

THE 111 CALL PATH — NO DEAD-AIR, NO SERIAL RINGING

```
Caller dials 111   ● recording starts   ● incident ID assigned
   │
   ▼  ert_emergency_queue — ring ALL available ERT positions, 20s
   │        press 1 any time ──────► first-aid fast-path (102)
   ├─ answered ─► ERT: classify · dispatch · log · recording linked
   │
   │  no answer point free → IN PARALLEL:
   ├─► Offline Panic-Coach 102          ┌ BACKGROUND alert (call-files):
   │   deterministic first-aid, zero    │ Lead 4101 + Security 4300 +
   │   internet.  9=retry  8=message     │ Medical 4200 + Warden
   │        │                           └ "press 1 to join the queue"
   │        ▼  message
   │   Emergency Voicemail (60s)
   │        ▼
   └─► Missed Emergency Incident — Critical, Pending Review
       (final catch — nothing is ever dropped)
```

RESPONDER POSITIONS — STAFFED BY SHIFT

EXT	ROLE	111 QUEUE?
4101	ERT Lead / Incident Cmdr	Escalation
4110–19	ERT Operators	ANSWERS
4120	Control Room	ANSWERS
4200s	Medical (4200 dispatch)	Dispatch
4300s	Security (4301 Lead)	Dispatch
4400/4500/4600s	Warden · Admin/Ops · IT	Dispatch
4700s	Fixed devices	No

ERT positions answer the queue; the rest are dispatch targets. Each dept = dispatch front-door + minimal seats.

GOLDEN RULES

- **111 is human-first** — never depends on AI / internet / cellular.
- **Unsure? Escalate.** Never drop an emergency call silently.
- **Only 111 / 199 are recorded** — student-to-student calls never are.
- **Emergency controls role-restricted · back up before every change; test 199 before 111.**

DONE & VALIDATED LIVE

- SIP reg on real Androids; two-way audio
- **111 rings a real handset** (on-shift)
- Offline coach 102; real 111 recording
- Status API :8090; VM autostart + 1-cmd deploy
- 32 SOPs · 8 Blueprints · Journal

BUILDABLE NEXT

- Real recorded voice prompts
- QR / profile phone provisioning
- Console served over LAN
- Filled test-evidence sheet

Deferred by choice: DPDP compliance · cost/BOM.

NEEDS HARDWARE / DECISION

- **#1 — off QEMU NAT → real LAN IP** (van Linux / bridged)
- TLS + SRTP encryption
- Always-on ERT Androids · van UPS
- mDNS/DHCP · full pilot + go-live

SET UP A NEW WINDOWS PC — ONE COMMAND

```
powershell -ExecutionPolicy Bypass -File .\Install-UpesEcs.ps1
```

Prereqs + PBX VM + all accounts + autostart + Console + TV boards. Variants: `-LanIp` · `-LaunchTV` · `-Rebuild` · `-Uninstall`. Internet needed only for the first build.

ADD A PERSON — NEVER CHANGES AN EXISTING PASSWORD

```
powershell -File deploy\qemu\Add-UpesUser.ps1 -SapId 500123394 -Name "Kinjal Srivastava"
```

SAP ID = ext = username. Generates the secret once, pins it as single source of truth, pushes live, syncs roster + wallboard directory.

CAMPUS SCREENS & DAY-TO-DAY

Public safety board (giant DIAL 111)	`:8080/tv-safety.html`
Operations board (queue, KPIs)	`:8080/tv-ops.html`
Launch both TVs · re-point LAN IP	`Show-TV -Both` · `Set-UpesLanIp`

STORAGE & RETENTION

Recordings & voicemail	90 days
Incidents · CDR/CEL · queue/paging/conf logs	1 year
Config backups	30 daily + 12 weekly

No captured call audio is ever left on a server or shipped in an installer — only generated TTS prompts.

Remaining work is execution, not design.
Stand up on a real LAN IP → run the Pilot Test Plan → sign off go-live.

EMERGENCY **111**