

# Repository and microservice reorganization — specification

Repository & microservice split — SPEC R1 (normative)

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Source: 20260618\_repos\_reorganizing.md — section links work in PDF viewers that support internal anchors.

**Document type:** SPEC

**Source draft:** docs/drafts/20260618\_repos\_reorganizing.txt

**Design review:** docs/DRs/20260618\_repos\_reorganizing.md (frozen)

**PDF:** 20260618\_repos\_reorganizing.pdf · Regenerate: bash scripts/build-all-docs-pdf.sh

**Status:** Accepted from frozen DR R1.1 — implementation phased; monolith remains deployable until each migration step completes

**Scope:** Split `git://f0xx.org/android_cast` monolith into `git org ac` on the **f0xx.org git server** — full microservice end-state, VM-first cloud path

**Related:** INFRA.md · BUILD\_DEPLOY.md · specs/20100612\_1\_scaling.md · orchestration/sim/cluster0/ARCHITECTURE.md

**VCS (normative):** Canonical remotes are `git://f0xx.org/ac/<repo>` — repos are **created on the PO git server** (bare repos, hooks, ACLs).

**Gitea** at `.../git/` is a **browse UI** over mirrors only. Optional HTTPS read-only: [Appendix B](#).

## 1. Purpose

Define the **normative** end-state and **ordered migration** for splitting the AndroidCast monolith (`git://f0xx.org/android_cast`) into:

- Independent **git repositories** under `org ac` on the **f0xx.org git server**
- **Microservice APIs** (OpenAPI) and **thin backend UIs**
- **One public URI root per microproject** under `https://apps.f0xx.org/app/androidcast_project/`
- **Phased delivery** without a forced big-bang during alpha

**Identity gate:** `ac-ms-identity` (migration Step 6) **MUST** complete before any other domain microservice split.

## 2. Scope

| In scope                                                                         | Out of scope (this SPEC)                                |
|----------------------------------------------------------------------------------|---------------------------------------------------------|
| Repo catalog, disk paths, git remotes (Appendix A)                               | K8s / service mesh (optional later)                     |
| Path-per-microproject URL map (§7)                                               | SFU/media transcode runtime (F1/F2 repos listed only)   |
| 13-step migration plan (§9)                                                      | Rewriting mobile codec stack                            |
| Platform libs (Composer) before MS split                                         | Gitea as repo provisioning UI                           |
| Optional HTTPS read-only git (Appendix B)                                        | Merging AndroidCast with unrelated git hosting products |
| <code>ac-workspace</code> manifest + OTA multi-repo SHAs                         | Unified monorepo build in <code>ac-workspace</code>     |
| VM lift-and-shift mapping to scaling SPEC                                        |                                                         |
| Unrelated nested git trees under <code>examples/</code> (not product submodules) |                                                         |

**Git submodules (monolith → split):** **only** `third-party/*` (mobile deps) and `backend/url-shortener`.

**Alpha:** Production **MAY** continue on the monolith until migration Step 8+ per service; each step **MUST** leave prior steps deployable.

## 3. Requirements

### 3.1 Must

| ID       | Requirement                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| R-VCS-1  | Canonical remote: <code>git://f0xx.org/ac/&lt;repo&gt;</code> ; PO creates bare repos on git server                                               |
| R-VCS-2  | Gitea at <code>.../git/</code> is browse-only mirror; agents <b>MUST NOT</b> provision repos in Gitea                                             |
| R-URL-1  | Public base prefix: <code>/app/androidcast_project/</code>                                                                                        |
| R-URL-2  | Target URLs <b>MUST NOT</b> use <code>/crashes/</code> or <code>?view=</code> (legacy 301 only, ≥ one release)                                    |
| R-URL-3  | One path root per microproject (§7.2)                                                                                                             |
| R-URL-4  | Auth at project root: <code>/login</code> , <code>/logout</code> , <code>/register</code> , <code>/two-factor</code> , <code>/verify-email</code> |
| R-ARCH-1 | Full microservice end-state per §5–§6                                                                                                             |
| R-ARCH-2 | <code>ac-ms-identity</code> gate before domain MS extraction (Step 6)                                                                             |
| R-ARCH-3 | <code>ac-scripts</code> separate; <code>ac-deploy</code> consumes it                                                                              |
| R-MIG-1  | Migration steps §9 executed in order; gates <b>MUST NOT</b> be skipped                                                                            |
| R-SUB-1  | Monolith submodules: <b>only</b> <code>third-party/*</code> and <code>backend/url-shortener</code>                                                |
| R-SUB-2  | No other nested git submodules in product repos or <code>ac-workspace</code> manifests                                                            |
| R-TEST-1 | Each step verification in §9 and §12 <b>MUST</b> pass before the next step starts                                                                 |

### 3.2 Should

| ID      | Requirement                                                                   |
|---------|-------------------------------------------------------------------------------|
| R-VCS-3 | Optional HTTPS read-only clones via <code>git -r.f0xx.org</code> (Appendix B) |

|         |                                                                            |
|---------|----------------------------------------------------------------------------|
| R-VCS-4 | Disk layout ac/<repo> under configurable GIT_ROOT (default /var/git/)      |
| R-URL-5 | Cookie path /app/androidcast_project until SSO replaces shared PHP session |
| R-DOC-1 | OpenAPI stubs per MS in ac-docs/openapi/ after Step 4                      |

### 3.3 Non-goals

- Big-bang cutover before identity MS and edge shell exist
- ac-ms-vcs application repo (VCS is infrastructure)
- https://f0xx.org/... as git smart HTTP endpoint
- AndroidCast code reading /etc/git-ro/ token ACL files (Appendix B is ops-only)

## 4. Baseline (current monolith)

### 4.1 Monolith map

| Monolith path                    | Future repo(s)             | Notes                                                   |
|----------------------------------|----------------------------|---------------------------------------------------------|
| app/, ndk/, gradle/              | ac-mobile-android          | third-party submodules                                  |
| desktop/session-studio/          | ac-session-studio          | Low coupling                                            |
| docs/                            | ac-docs                    |                                                         |
| scripts/                         | ac-scripts                 |                                                         |
| orchestration/                   | ac-deploy                  | cluster0, docker                                        |
| examples/crash_reporter/backend/ | ac-ms-* + ac-be-*          | <b>32 PHP classes</b> , 24 APIs                         |
| examples/build_console/          | ac-ms-build, ac-be-builder | Same DB users                                           |
| examples/app_hub/                | ac-be-hub                  | Loads shared platform-web assets (not /crashes/assets/) |
| backend/url-shortener/           | ac-ms-url-shortener        | Existing submodule                                      |

### 4.2 What is not a git repo

- **Gitea** — read-only web UI over git mirrors on BE (:3000); **not** where repos are created
- **MariaDB, Janus** (:8089)

### 4.3 Git submodules (monolith — only these)

| Path                   | Role after split                                             |
|------------------------|--------------------------------------------------------------|
| third-party/*          | Native/codecs deps (submodules of <b>ac-mobile-android</b> ) |
| backend/url-shortener/ | URL shortener → <b>ac-ms-url-shortener</b>                   |

No other directories in the monolith carry git submodules. Post-split, **ac-deploy** may submodule **ac-scripts** (repo-to-repo pin).

## 5. Target architecture

Platform (Composer / static — not runtime MS)  
ac-platform-php, ac-platform-db, ac-platform-web, ac-scripts, ac-docs

Infrastructure  
ac-deploy submodules ac-scripts; docker, cluster0, nginx  
ac-platform-edge nginx BFF: routes + session cookie domain  
ac-workspace optional clone manifest (no unified build)

Clients  
ac-mobile-android, ac-mobile-ios (future), ac-session-studio

Microservices (OpenAPI)  
ac-ms-identity → ac-ms-rbac → ac-ms-devices  
ac-ms-issues, ac-ms-tickets, ac-ms-graphs, ac-ms-remote-access  
ac-ms-url-shortener, ac-ms-build, ac-ms-ota, ac-ms-notifications (later)

Backend UI (thin → MS APIs)  
ac-be-hub, ac-be-issues, ac-be-tickets, ac-be-graphs,  
ac-be-remote-access, ac-be-access, ac-be-builder, ac-be-auth

### Consolidations vs initial PO sketch:

| Initial name                         | R0 decision                                                               |
|--------------------------------------|---------------------------------------------------------------------------|
| ac-be-console (monolith)             | Dissolved into ac-be-issues ... ac-be-access                              |
| ac-ms-tracker                        | <b>ac-ms-issues + ac-ms-tickets</b>                                       |
| ac-ms-vpn-rssh + ac-ms-vpn-wireguard | <b>ac-ms-remote-access</b> (single control plane)                         |
| ac-ms-analytics                      | <b>ac-ms-graphs</b> (+ BI later)                                          |
| ac-ms-orchestration                  | <b>ac-ms-build + ac-deploy</b>                                            |
| ac-ms-vcs                            | <b>Not a repo</b> — Gitea is infra/UI only; git server is source of truth |

## 6. Git repository catalog

**Canonical remote:** `git://f0xx.org/ac/<repo>` — PO provisions **bare repos on the git server** (org namespace ac).

**Browse UI (optional):** `https://apps.f0xx.org/app/androidcast_project/git/ac/<repo>` — Gitea mirror for humans; push/fetch use git server.

**Legacy:** `git://f0xx.org/android_cast` → read-only mirror until retired.

### 6.1 Structure rationale (R1)

The catalog below is the **recommended end-state** for this project:

- **\*\*Platform libs (P\*)\*\*** before microservices — avoids auth/DB duplication across 10+ PHP trees.
- **\*\*Thin BE UI (B\*)\*\*** **separate from** MS APIs (S\*) — **matches PO's** one public URI per microproject\*\* (§7).
- **ac-deploy + ac-scripts** as the only deploy orchestration entry — fits VM roles in scaling SPEC.
- **No** `ac-ms-vcs` **repo** — VCS is infrastructure, not application code.

PO's initial sketch used deeper folder names (`ac-backend/*`, `ac-microservice/*`). **R1 keeps the flatter** `ac-<name>` **list** — easier permissions, clone URLs, and OTA manifest entries. Minor renames are acceptable; **dependency order and URI split are locked**.

| ID  | Repo                | Git URL                                            | Role                             |
|-----|---------------------|----------------------------------------------------|----------------------------------|
| W0  | ac-workspace        | <code>git://f0xx.org/ac/ac-workspace</code>        | Optional submodule manifest      |
| P0  | ac-platform-php     | <code>git://f0xx.org/ac/ac-platform-php</code>     | Composer: auth client, PDO, HTTP |
| P1  | ac-platform-db      | <code>git://f0xx.org/ac/ac-platform-db</code>      | SQL migrations                   |
| P2  | ac-platform-web     | <code>git://f0xx.org/ac/ac-platform-web</code>     | Shared CSS/JS/theme              |
| P3  | ac-platform-edge    | <code>git://f0xx.org/ac/ac-platform-edge</code>    | nginx routes + proxy             |
| P4  | ac-scripts          | <code>git://f0xx.org/ac/ac-scripts</code>          | CI, OTA, native codecs, PDF      |
| P5  | ac-docs             | <code>git://f0xx.org/ac/ac-docs</code>             | Documentation                    |
| D0  | ac-deploy           | <code>git://f0xx.org/ac/ac-deploy</code>           | docker, cluster0; <b>uses P4</b> |
| C0  | ac-mobile-android   | <code>git://f0xx.org/ac/ac-mobile-android</code>   | Android + ndk + third-party      |
| C1  | ac-mobile-ios       | <code>git://f0xx.org/ac/ac-mobile-ios</code>       | Future iOS                       |
| C2  | ac-session-studio   | <code>git://f0xx.org/ac/ac-session-studio</code>   | Desktop analyzer                 |
| S0  | ac-ms-template      | <code>git://f0xx.org/ac/ac-ms-template</code>      | New MS cookiecutter              |
| S1  | ac-ms-identity      | <code>git://f0xx.org/ac/ac-ms-identity</code>      | Users, login, 2FA, sessions      |
| S2  | ac-ms-rbac          | <code>git://f0xx.org/ac/ac-ms-rbac</code>          | Companies, privileges            |
| S3  | ac-ms-devices       | <code>git://f0xx.org/ac/ac-ms-devices</code>       | Device registry                  |
| S4  | ac-ms-issues        | <code>git://f0xx.org/ac/ac-ms-issues</code>        | Crash/report ingest              |
| S5  | ac-ms-tickets       | <code>git://f0xx.org/ac/ac-ms-tickets</code>       | Ticket workflow                  |
| S6  | ac-ms-graphs        | <code>git://f0xx.org/ac/ac-ms-graphs</code>        | Graph ingest/query               |
| S7  | ac-ms-remote-access | <code>git://f0xx.org/ac/ac-ms-remote-access</code> | WG + RSSH API                    |
| S8  | ac-ms-url-shortener | <code>git://f0xx.org/ac/ac-ms-url-shortener</code> | Short links API                  |
| S9  | ac-ms-build         | <code>git://f0xx.org/ac/ac-ms-build</code>         | Build worker API                 |
| S10 | ac-ms-ota           | <code>git://f0xx.org/ac/ac-ms-ota</code>           | Channel manifests                |
| S11 | ac-ms-notifications | <code>git://f0xx.org/ac/ac-ms-notifications</code> | SMTP (post-alpha)                |
| B0  | ac-be-hub           | <code>git://f0xx.org/ac/ac-be-hub</code>           | Landing                          |
| B1  | ac-be-issues        | <code>git://f0xx.org/ac/ac-be-issues</code>        | Issues UI                        |

|    |                       |                                         |                      |
|----|-----------------------|-----------------------------------------|----------------------|
| B2 | ac-be-tickets         | git://f0xx.org/ac/ac-be-tickets         | Tickets UI           |
| B3 | ac-be-graphs          | git://f0xx.org/ac/ac-be-graphs          | Graphs UI            |
| B4 | ac-be-remote-access   | git://f0xx.org/ac/ac-be-remote-access   | RA admin UI          |
| B5 | ac-be-access          | git://f0xx.org/ac/ac-be-access          | RBAC admin UI        |
| B6 | ac-be-builder         | git://f0xx.org/ac/ac-be-builder         | Builder UI           |
| B7 | ac-be-auth            | git://f0xx.org/ac/ac-be-auth            | Login/register shell |
| F1 | ac-ms-sfu-signaling   | git://f0xx.org/ac/ac-ms-sfu-signaling   | Future F1            |
| F2 | ac-ms-media-transcode | git://f0xx.org/ac/ac-ms-media-transcode | Future VOD           |

Third-party codecs remain **submodules of C0** (upstream URLs); optional **git-server mirrors** under ac/ for backup (sync scripts, not Gitea-as-SoT).

## 6.2 Repo creation waves (git server)

PO creates bare repos on the **git server** in waves (Gitea mirror sync follows). Agent/docs do **not** “create repos in Gitea.”



## 7. Public URL specification

**Base prefix (locked):** [https://apps.f0xx.org/app/androidcast\\_project](https://apps.f0xx.org/app/androidcast_project)

### 7.1 Rules (R1 — PO locked)

- No /crashes/ in target URLs** — legacy path **301** → correct microproject root for ≥ one release, then drop from nginx/docs/mobile.
- No ?view= routing** — each product surface has its **own path root** and (eventually) its **own BE UI repo + nginx** location.
- Auth at project root** — /login, /logout, /register, /two-factor, /verify-email (not under /issues/).
- Shared cookie path** — /app/androidcast\_project at **ac-platform-edge** until SSO tokens replace shared PHP session.

### 7.2 Target path catalog (one URI per microproject)

| Microproject          | Target URL root                   | Repo (UI / API)                              | Notes                               |
|-----------------------|-----------------------------------|----------------------------------------------|-------------------------------------|
| Hub / landing         | .../                              | ac-be-hub                                    | Entry cards link to path roots only |
| Auth                  | .../login, .../logout, ...        | ac-be-auth → ac-ms-identity                  | Project-root paths                  |
| Issues (reports)      | .../issues/                       | ac-be-issues / ac-ms-issues                  | Was ?view=reports                   |
| Issue detail          | .../issues/{id}                   | ac-be-issues                                 | Was ?view=report&id=                |
| Tickets               | .../tickets/                      | ac-be-tickets / ac-ms-tickets                | Was ?view=tickets                   |
| Ticket detail         | .../tickets/{id}                  | ac-be-tickets                                | Was ?view=ticket&id=                |
| Analytics / graphs    | .../graphs/                       | ac-be-graphs / ac-ms-graphs                  | Already separate                    |
| RBAC / access         | .../access/                       | ac-be-access / ac-ms-rbac                    | Was ?view=rbac                      |
| Remote access         | .../remote-access/                | ac-be-remote-access / ac-ms-remote-access    | Was ?view=remote_access             |
| Short links           | .../short-links/                  | ac-be-hub or thin UI / ac-ms-url-shortener   | Was ?view=short_links               |
| Live sessions         | .../live-sessions/                | ac-be-issues (or ac-be-live) / live_cast API | Was ?view=live_sessions             |
| Live join / education | .../live/join, .../live/education | shared live pages                            | Under issues until split            |
| Builder               | .../build/                        | ac-be-builder / ac-ms-build                  | Unchanged                           |
| Git browse            | .../git/                          | Gitea UI (mirror)                            | Not a microservice repo             |
| OTA                   | /v0/ota/                          | ac-ms-ota                                    | Top-level on apps host              |

**API examples:** .../issues/api/upload (not .../crashes/api/upload.php).

### 7.3 Migration table (legacy → target)

| Legacy (forbidden in target)  | Target URL   |
|-------------------------------|--------------|
| .../crashes/?view=reports     | .../issues/  |
| .../crashes/?view=report&id=N | .../issues/N |
| .../crashes/?view=tickets     | .../tickets/ |

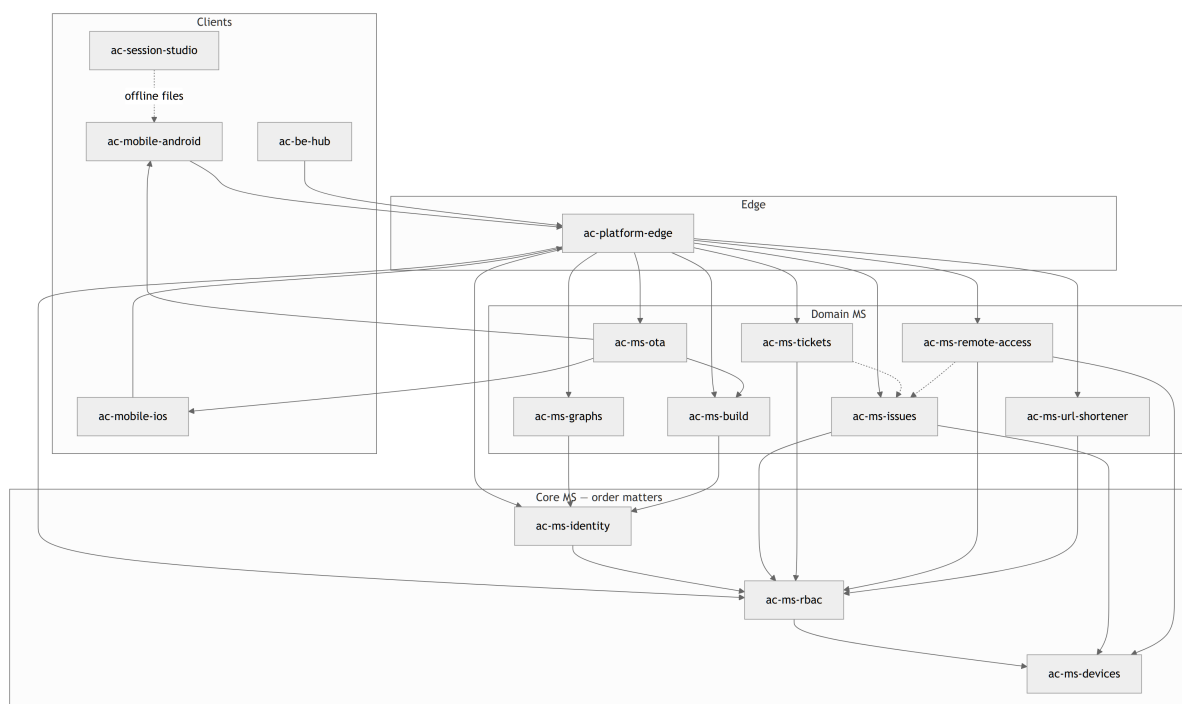
|                                 |                                 |
|---------------------------------|---------------------------------|
| .../crashes/?view=ticket&id=N   | .../tickets/N                   |
| .../crashes/?view=home          | .../issues/ or .../ (hub)       |
| .../crashes/?view=rbac          | .../access/                     |
| .../crashes/?view=remote_access | .../remote-access/              |
| .../crashes/?view=short_links   | .../short-links/                |
| .../crashes/?view=live_sessions | .../live-sessions/              |
| .../crashes/?view=graphs        | .../graphs/                     |
| .../crashes/login               | .../login                       |
| .../crashes/api/upload.php      | .../issues/api/upload           |
| .../crashes/ (any)              | <b>301</b> → matching row above |

**Monolith shim (Step 5 only):** nginx may internally rewrite /issues/ → legacy PHP ?view=reports until ac-ms-issues exists — **not** exposed in links, docs, or mobile defaults.

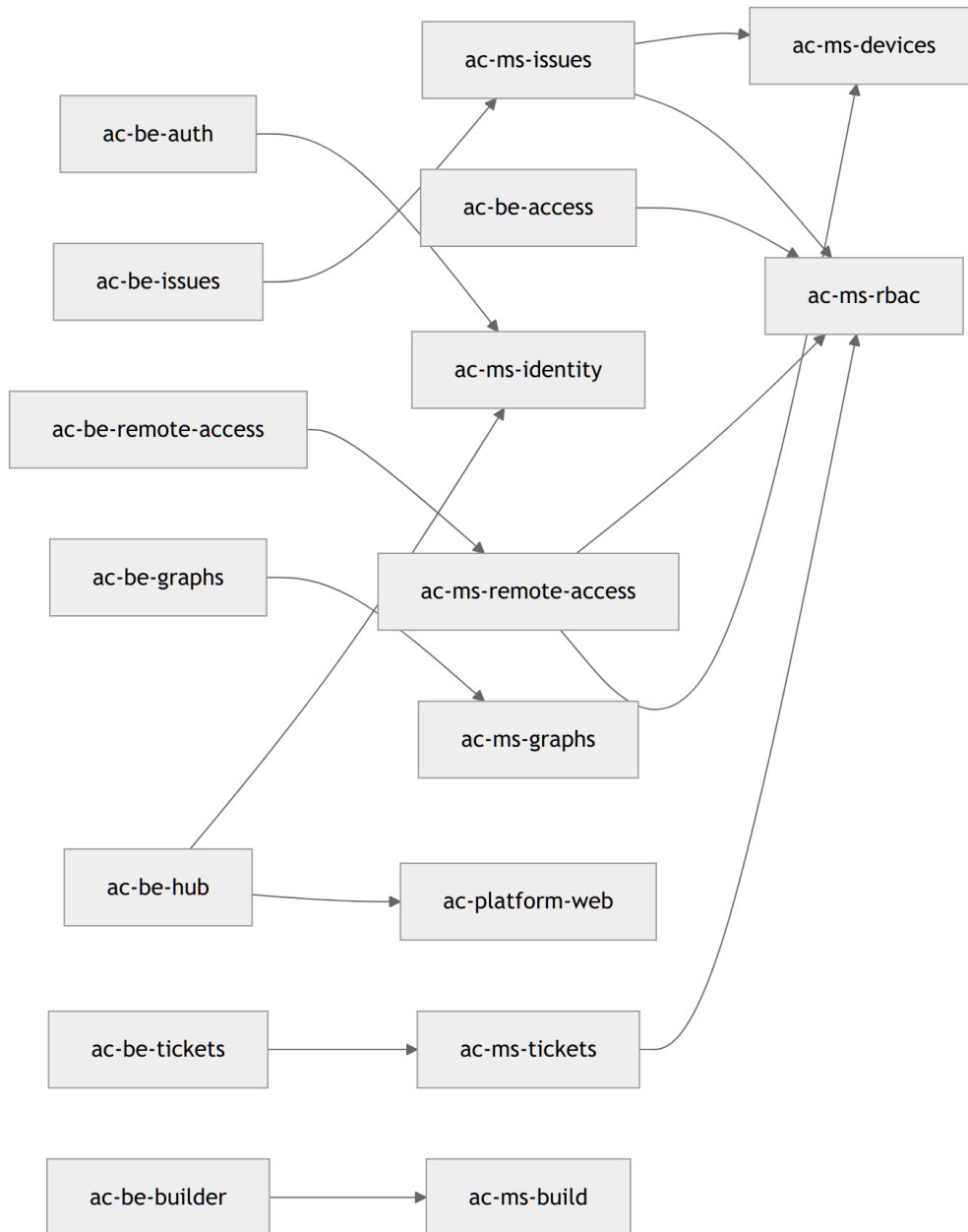
**Code updates:** BackendEndpoints.java, hub index.php, all console nav, OpenAPI base paths, deploy nginx fragments.

## 8. Dependency graphs

### 8.1 End-to-end — clients, edge, services

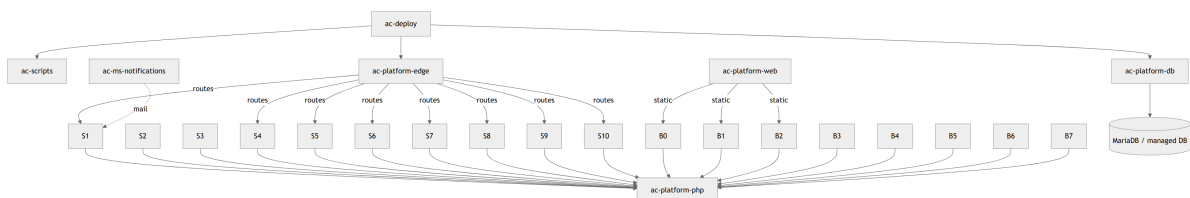


### 8.2 Backend UI → microservice (requires)



Every **B\*** and **S\*** also requires **P0** (ac-platform-php) and **P1** (ac-platform-db) via Composer — omitted from diagram for clarity.

### 8.3 Platform and deploy layer



### 8.4 Service dependency matrix

| Service          | Requires (hard)           | Requires (soft)       | Required by                                 |
|------------------|---------------------------|-----------------------|---------------------------------------------|
| ac-platform-db   | —                         | —                     | All MS, migration jobs                      |
| ac-platform-php  | ac-platform-db            | —                     | All MS, all BE UI                           |
| ac-platform-web  | —                         | —                     | ac-be-hub, all BE UI                        |
| ac-platform-edge | ac-deploy nginx templates | all MS upstream addrs | All public HTTP                             |
| ac-ms-identity   | platform-db, platform-php | ac-ms-notifications   | All MS, all BE UI, ac-ms-build              |
| ac-ms-rbac       | ac-ms-identity            | —                     | devices, issues, tickets, RA, url-shortener |
| ac-ms-devices    | ac-ms-rbac                | ac-ms-identity        | ac-ms-issues, ac-ms-remote-access           |

|                     |                                                      |                    |                             |
|---------------------|------------------------------------------------------|--------------------|-----------------------------|
| ac-ms-issues        | ac-ms-rbac, ac-ms-devices                            | —                  | ac-be-issues, mobile upload |
| ac-ms-tickets       | ac-ms-rbac                                           | ac-ms-issues       | ac-be-tickets               |
| ac-ms-graphs        | ac-ms-identity                                       | —                  | ac-be-graphs, mobile        |
| ac-ms-remote-access | ac-ms-rbac, ac-ms-devices                            | ac-ms-issues       | ac-be-remote-access, mobile |
| ac-ms-url-shortener | ac-ms-rbac                                           | —                  | hub/admin UI                |
| ac-ms-build         | ac-ms-identity                                       | git server mirrors | ac-be-builder, ac-ms-ota    |
| ac-ms-ota           | ac-ms-build                                          | C0, C1 SHAs        | mobile OTA clients          |
| ac-mobile-android   | ac-ms-issues, ac-ms-graphs, ac-ms-remote-access APIs | ac-ms-ota          | —                           |

## 8.5 Repo creation waves

See §6.2 for the ordered wave diagram.

## 9. Migration plan

Ordered steps for converting the monolith. **Do not skip gates.** Each step lists repos created/moved, monolith paths affected, and verification (see also §12).

### Step 1 — Git org ac on f0xx.org server (no code move)

**Goal:** Namespace ac exists on the **git server**; legacy monolith mirror preserved; Gitea browse UI synced.

| Action             | Detail                                                                                |
|--------------------|---------------------------------------------------------------------------------------|
| Create org / paths | PO: bare repos under <code>git://f0xx.org/ac/&lt;repo&gt;</code> on git server        |
| Mirror             | <code>android_cast</code> → read-only; plan <code>ac-workspace</code> or retire later |
| Gitea (optional)   | Sync mirrors for <code>.../git/</code> browse UI only — <b>not</b> repo creation      |
| Update docs        | Pointer in <code>INFRA.md</code> , <code>AGENTS.md</code>                             |

**Verify:** `git ls-remote git://f0xx.org/ac/ac-docs` (after Step 2) ; legacy push still works.

**Requires:** nothing

**Enables:** all following steps

### Step 2 — Extract zero-coupling repos

**Goal:** Repos with no runtime dependency on PHP monolith.

| Repo                | From monolith                             | CI                                                |
|---------------------|-------------------------------------------|---------------------------------------------------|
| ac-docs             | <code>docs/</code>                        | PDF build                                         |
| ac-scripts          | <code>scripts/</code>                     | lint/smoke                                        |
| ac-session-studio   | <code>desktop/session-studio/</code>      | unit tests                                        |
| ac-ms-url-shortener | <code>backend/url-shortener/</code>       | PHPUnit (change remote URL only if already split) |
| ac-deploy           | <code>orchestration/</code> + nginx seeds | docker compose smoke                              |

**ac-deploy** submodules **ac-scripts** at pinned SHA.

**Verify:** Each repo builds independently; monolith submodule paths updated OR mirror dual-push during transition.

**Requires:** Step 1

**Enables:** Steps 3–4

### Step 3 — Platform libraries (foundation)

**Goal:** Shared code leaves monolith as Composer packages — **no MS split yet.**

| Repo            | Extract from                                                                                                                |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| ac-platform-db  | <code>sql/</code> , migrations from <code>crash_reporter</code> + <code>url-shortener</code>                                |
| ac-platform-php | <code>Auth*</code> , <code>Database</code> , <code>Rbac</code> helpers, bootstrap patterns, <code>shared_session.php</code> |
| ac-platform-web | <code>crashes/assets/</code> , shared theme referenced by hub                                                               |

Monolith **requires** packages via Composer; behavior unchanged.

**Verify:** Monolith tests green; single login still works across `hub/crashes/build`.

**Requires:** Step 2

**Enables:** Step 4 (identity)

### Step 4 — Microservice template and OpenAPI baseline

**Goal:** Cookiecutter + contract layout for all MS.

| Repo           | Action                                                             |
|----------------|--------------------------------------------------------------------|
| ac-ms-template | Copy <code>url-shortener</code> + <code>platform-php</code> wiring |
| ac-docs        | Add <code>openapi/</code> stubs per service                        |

**Verify:** Scaffold new empty MS from template; deploy locally via ac-deploy.

**Requires:** Step 3

**Enables:** Step 5

## Step 5 — Edge proxy (routing shell)

**Goal:** **ac-platform-edge** nginx config routes paths; still proxies to **monolith** PHP until MS exist.

| Action             | Detail                                                       |
|--------------------|--------------------------------------------------------------|
| Deploy edge config | Map /issues/ → monolith ?view=reports internally (temporary) |
| Cookie             | Single path /app/androidcast_project                         |

**Verify:** `curl -I` new paths return 200 via rewrite; old URLs still work.

**Requires:** Step 2 (ac-deploy)

**Enables:** Step 10 URL cutover

## Step 6 — Identity microservice (GATE)

**Goal:** **ac-ms-identity** owns users, login, register, 2FA, session issuance.

| Repo           | From monolith                                            |
|----------------|----------------------------------------------------------|
| ac-ms-identity | Auth*, UserRepository, AuthTotp*, AuthRegistration*, ... |
| ac-be-auth     | login/register views (thin)                              |

Monolith/builder **call identity** for auth (HTTP or shared session bridge during transition).

**Verify:** Login at /app/androidcast\_project/ + builder; sessions valid; `./scripts/test_rbac_api.sh` still passes against bridged auth.

**Requires:** Steps 3, 4

**Enables:** Steps 7, 9, 11 — **nothing else splits before this**

## Step 7 — RBAC and devices microservices

**Goal:** Company scope and device registry are independent APIs.

| Repo          | From monolith                    |
|---------------|----------------------------------|
| ac-ms-rbac    | Rbac*, RbacAdmin*, companies API |
| ac-ms-devices | DeviceRepository                 |

**Verify:** Upload still registers device; RBAC panel works via APIs.

**Requires:** Step 6

**Enables:** Steps 8, 9

## Step 8 — Issues and tickets (domain core)

**Goal:** Split PO's primary URL surfaces.

| Repo          | From monolith                      |
|---------------|------------------------------------|
| ac-ms-issues  | upload, Report*, Tag*, reports API |
| ac-ms-tickets | Ticket*, attachments               |
| ac-be-issues  | reports views + JS                 |
| ac-be-tickets | tickets views + JS                 |

**Edge** routes /issues/ → S4/B1, /tickets/ → S5/B2.

**Verify:** Mobile upload to new URL; web issue/ticket lists; E2E ticket workflow.

**Requires:** Step 7

**Enables:** Step 9 (RA links to issues)

## Step 9 — Graphs and remote access

| Repo                | From monolith                    |
|---------------------|----------------------------------|
| ac-ms-graphs        | GraphRepository, graph_* API     |
| ac-ms-remote-access | RemoteAccess*, WireGuard*, Rssh* |
| ac-be-graphs        | graphs UI                        |
| ac-be-remote-access | remote_access view               |

**Verify:** BackendEndpoints graph URL; RA E2E (`ra_e2e_cli.sh`); mobile RA API.

**Requires:** Steps 7, 8 (RA → devices, issue links)

**Enables:** Step 11

## Step 10 — Hub, access UI, URL migration

| Repo             | Action                                                        |
|------------------|---------------------------------------------------------------|
| ac-be-hub        | Extract app_hub; use <b>ac-platform-web</b> assets            |
| ac-be-access     | RBAC UI → calls ac-ms-rbac                                    |
| ac-platform-edge | Enable <b>301</b> from /crashes/ and ?view=* to §7 path roots |

**Verify:** Hub cards link to /issues/, /tickets/; no broken CSS.

**Requires:** Steps 5, 8, 9

**Enables:** Step 11

## Step 11 — Build and OTA pipeline

| Repo              | From monolith                              |
|-------------------|--------------------------------------------|
| ac-ms-build       | BuildRunner, build APIs                    |
| ac-be-builder     | build_console UI                           |
| ac-ms-ota         | OTA manifest assembly                      |
| ac-mobile-android | app/, ndk/, gradle (extract from monolith) |

**Verify:** Builder triggers APK; OTA channel publishes; manifest lists android (+ ios when C1 exists).

**Requires:** Step 6 (identity for builder users)

**Enables:** Step 12

## Step 12 — Optional workspace and monolith retirement

| Action            | Detail                                                             |
|-------------------|--------------------------------------------------------------------|
| ac-workspace      | Publish optional .gitmodules manifest                              |
| Retire            | Stop commits to android_cast monolith; archive mirror              |
| Gitea mirror sync | Update mirror scripts for org ac (server → Gitea UI; gitea README) |

**Verify:** Fresh clone via ac-workspace or individual repos; prod deploy from ac-deploy only.

**Requires:** Steps 1–11 complete for services in scope

**Enables:** cloud VM scaling, future F1/F2 MS

## Step 13 — Notifications and cloud hardening (post-alpha)

| Repo                | Action                                              |
|---------------------|-----------------------------------------------------|
| ac-ms-notifications | Extract AuthMailer; wire 2.x mail when unblocked    |
| ac-deploy           | Managed DB DSN templates; cluster0 → cloud VM roles |

**Requires:** Step 6; mail infra (developer)

**Enables:** full 2FA mail E2E

## Conversion step summary (quick reference)

| Step | Name                                                 | Gate        |
|------|------------------------------------------------------|-------------|
| 1    | Git org ac on server                                 | —           |
| 2    | docs, scripts, deploy, session-studio, url-shortener | —           |
| 3    | platform-php, platform-db, platform-web              | —           |
| 4    | ms-template, OpenAPI                                 | —           |
| 5    | platform-edge (shell)                                | —           |
| 6    | <b>ms-identity</b> , be-auth                         | <b>GATE</b> |
| 7    | ms-rbac, ms-devices                                  | after 6     |
| 8    | ms-issues, ms-tickets, be-issues, be-tickets         | after 7     |
| 9    | ms-graphs, ms-remote-access, be UI                   | after 7–8   |
| 10   | be-hub, be-access, URL 301                           | after 8–9   |
| 11   | ms-build, ms-ota, mobile-android                     | after 6     |
| 12   | ac-workspace, retire monolith                        | after 1–11  |
| 13   | notifications, cloud                                 | post-alpha  |

## 10. Infrastructure and cloud

| Stage         | Pattern                                                   |
|---------------|-----------------------------------------------------------|
| Prod today    | FE TLS → BE :80 nginx + PHP-FPM + MariaDB                 |
| cluster0 lab  | cast01–03; NFS config only; GTID DB (ARCHITECTURE.md)     |
| Cloud phase A | 4–6 VMs: be-web, be-data, be-ops, be-build (scaling §6.3) |
| Cloud phase B | Managed DB; DSN in secrets (not in git)                   |
| Cloud phase C | K8s optional — not required at R0                         |

**Inter-service calls:** HTTP on private VLAN / localhost initially; OpenAPI in ac-docs. No service mesh at R0.

**ac-deploy** ships Ansible/docker-compose per VM role; submodules **ac-scripts**.

## 11. ac-workspace and OTA versioning

**ac-workspace** — optional; lists repo SHAs for a release train. **Not** a unified Gradle/PHP build.

**ac-ms-ota** manifest (same product version, per-platform SHAs):

```
{
  "channel": "staging",
  "version": "00.02.00.00",
  "artifacts": {
    "android": { "repo": "ac-mobile-android", "git_sha": "abc123" },
    "ios": { "repo": "ac-mobile-ios", "git_sha": "def456" }
  }
}
```

## 12. Verification and acceptance

Per-step gates from §9 — all **MUST** pass before the next step begins.

| Step | Acceptance criteria                                                                                               |
|------|-------------------------------------------------------------------------------------------------------------------|
| 1    | git ls-remote git://f0xx.org/ac/ac-docs succeeds (after Step 2 repo exists); legacy android_cast push still works |
| 2    | Each extracted repo builds/CI green independently                                                                 |
| 3    | Monolith tests green; single login across hub/issues/build                                                        |
| 4    | Empty MS scaffold deploys locally via ac-deploy                                                                   |
| 5    | curl -I on /issues/, /tickets/, ... return 200 via edge rewrite                                                   |
| 6    | Login + ./scripts/test_rbac_api.sh pass (identity gate)                                                           |
| 7    | Device upload + RBAC API via new services                                                                         |
| 8    | Mobile upload to .../issues/api/upload; ticket E2E                                                                |
| 9    | Graph + RA E2E (ra_e2e_cli.sh)                                                                                    |
| 10   | Hub links use path roots only; 301 from /crashes/                                                                 |
| 11   | Builder APK + OTA channel publish                                                                                 |
| 12   | Fresh clone via ac-workspace or per-repo remotes                                                                  |
| 13   | Mail E2E when infra unblocked                                                                                     |

**URL regression (ongoing):** hub, mobile BackendEndpoints, nginx fragments, and docs **MUST NOT** introduce new /crashes/ or ?view= links after Step 5.

**Repo index:** Appendix A disk paths **MUST** match live git server layout before Step 2 mass extract.

## 13. Risks and mitigations

| Risk                           | Mitigation                                             |
|--------------------------------|--------------------------------------------------------|
| Auth split breaks all consoles | Step 6 gate; session bridge during transition          |
| Hub broken CSS                 | ac-platform-web before ac-be-hub (Step 3 before 10)    |
| Mobile upload URL change       | Parallel endpoints + BackendEndpoints normalization    |
| DB schema drift                | ac-platform-db single migration stream                 |
| Too many repos to bump         | Composer semver for PO; not @common submodule diamond  |
| Alpha blocked                  | Monolith stays prod until Step 8+ complete per service |
| PO BE learning curve           | ac-ms-template, ac-deploy, OpenAPI, localhost HTTP     |

## Appendix A — Git disk paths and remotes

**Convention:** disk paths are **relative to the git server root** (example: /var/git/). PO may choose another root; keep the ac/<repo> layout.

**Canonical clone/fetch (write + read):** git://f0xx.org/ac/<repo>

**HTTPS read-only (optional):** see [Appendix B](#) — separate vhost; **not** https://f0xx.org/... app URLs.

| #  | Disk path (relative) | Git repo URL                        |
|----|----------------------|-------------------------------------|
| 1  | ac/ac-workspace      | git://f0xx.org/ac/ac-workspace      |
| 2  | ac/ac-platform-php   | git://f0xx.org/ac/ac-platform-php   |
| 3  | ac/ac-platform-db    | git://f0xx.org/ac/ac-platform-db    |
| 4  | ac/ac-platform-web   | git://f0xx.org/ac/ac-platform-web   |
| 5  | ac/ac-platform-edge  | git://f0xx.org/ac/ac-platform-edge  |
| 6  | ac/ac-scripts        | git://f0xx.org/ac/ac-scripts        |
| 7  | ac/ac-docs           | git://f0xx.org/ac/ac-docs           |
| 8  | ac/ac-deploy         | git://f0xx.org/ac/ac-deploy         |
| 9  | ac/ac-mobile-android | git://f0xx.org/ac/ac-mobile-android |
| 10 | ac/ac-mobile-ios     | git://f0xx.org/ac/ac-mobile-ios     |
| 11 | ac/ac-session-studio | git://f0xx.org/ac/ac-session-studio |
| 12 | ac/ac-ms-template    | git://f0xx.org/ac/ac-ms-template    |

|    |                          |                                         |
|----|--------------------------|-----------------------------------------|
| 13 | ac/ac-ms-identity        | git://f0xx.org/ac/ac-ms-identity        |
| 14 | ac/ac-ms-rbac            | git://f0xx.org/ac/ac-ms-rbac            |
| 15 | ac/ac-ms-devices         | git://f0xx.org/ac/ac-ms-devices         |
| 16 | ac/ac-ms-issues          | git://f0xx.org/ac/ac-ms-issues          |
| 17 | ac/ac-ms-tickets         | git://f0xx.org/ac/ac-ms-tickets         |
| 18 | ac/ac-ms-graphs          | git://f0xx.org/ac/ac-ms-graphs          |
| 19 | ac/ac-ms-remote-access   | git://f0xx.org/ac/ac-ms-remote-access   |
| 20 | ac/ac-ms-url-shortener   | git://f0xx.org/ac/ac-ms-url-shortener   |
| 21 | ac/ac-ms-build           | git://f0xx.org/ac/ac-ms-build           |
| 22 | ac/ac-ms-ota             | git://f0xx.org/ac/ac-ms-ota             |
| 23 | ac/ac-ms-notifications   | git://f0xx.org/ac/ac-ms-notifications   |
| 24 | ac/ac-be-hub             | git://f0xx.org/ac/ac-be-hub             |
| 25 | ac/ac-be-issues          | git://f0xx.org/ac/ac-be-issues          |
| 26 | ac/ac-be-tickets         | git://f0xx.org/ac/ac-be-tickets         |
| 27 | ac/ac-be-graphs          | git://f0xx.org/ac/ac-be-graphs          |
| 28 | ac/ac-be-remote-access   | git://f0xx.org/ac/ac-be-remote-access   |
| 29 | ac/ac-be-access          | git://f0xx.org/ac/ac-be-access          |
| 30 | ac/ac-be-builder         | git://f0xx.org/ac/ac-be-builder         |
| 31 | ac/ac-be-auth            | git://f0xx.org/ac/ac-be-auth            |
| 32 | ac/ac-ms-sfu-signaling   | git://f0xx.org/ac/ac-ms-sfu-signaling   |
| 33 | ac/ac-ms-media-transcode | git://f0xx.org/ac/ac-ms-media-transcode |
| 34 | android_cast             | git://f0xx.org/android_cast             |

**Bare repo on server (PO):** `git init --bare /var/git/ac/ac-workspace` (repeat per row; path = {GIT\_ROOT}/ + disk path).

## Appendix B — Optional HTTPS read-only git access

**Scope:** Standalone **git infrastructure** on the PO git host. **Not** part of the AndroidCast monorepo, BE PHP tree, Gitea product UI, or apps.f0xx.org consoles.

**Goal:** Keep `git://f0xx.org/...` for normal push/fetch; add `https://` for **read-only** clones (anonymous and/or token), with TLS certs and ACL files **outside** the AndroidCast project.

**Suggested hostname:** `git-r.f0xx.org` (read-only smart HTTP). Do **not** reuse `https://f0xx.org/` landing or `https://apps.f0xx.org/` app paths for git smart HTTP.

**Suggested paths on git server:**

| Path                                               | Purpose                                                                                    |
|----------------------------------------------------|--------------------------------------------------------------------------------------------|
| <code>/var/git/</code>                             | Bare repos (Appendix A disk layout)                                                        |
| <code>/etc/git-ro/</code>                          | nginx snippets, token maps, install scripts — <b>not</b> in <code>android_cast</code> repo |
| <code>/etc/git-ro/tokens/</code>                   | Per-token permission files (see step 8)                                                    |
| <code>/etc/letsencrypt/live/git-r.f0xx.org/</code> | Certbot certificates                                                                       |

### 1) DNS

Add an **A** (or **AAAA**) record for the read-only git vhost pointing at the **git server** public or edge IP (same host that serves `git://` today, or FE DNAT to it):

```
git-r.f0xx.org. IN A <GIT_SERVER_PUBLIC_IP>
```

Verify:

```
dig +short git-r.f0xx.org
```

### 2) Install packages (git server — example: Gentoo/Alpine)

On the machine that holds `/var/git/`:

```
emerge -av nginx git fcgiwrap certbot
```

```
apk add nginx git git-daemon fcgiwrap certbot certbot-nginx openssl
```

Enable `fcgiwrap` (smart HTTP via `git http-backend`):

```
systemctl enable --now fcgiwrap
```

### 3) Issue free TLS certificates (Certbot)

Run on the git server (or on FE if it terminates TLS and proxies to git — adjust plugin):

```
certbot certonly --standalone -d git-r.f0xx.org \
```

```
--agree-tos -m admin@f0xx.org --non-interactive
```

If nginx is already bound to :80/443, use the nginx plugin instead:

```
certbot certonly --nginx -d git-r.f0xx.org \
--agree-tos -m admin@f0xx.org --non-interactive
```

Certificates land under /etc/letsencrypt/live/git-r.f0xx.org/fullchain.pem and privkey.pem.

#### 4) nginx — HTTPS smart HTTP, read-only

Create /etc/git-ro/nginx-git-ro.conf (outside AndroidCast):

```
server {
    listen 443 ssl;
    server_name git-r.f0xx.org;

    ssl_certificate /etc/letsencrypt/live/git-r.f0xx.org/fullchain.pem;
    ssl_certificate_key /etc/letsencrypt/live/git-r.f0xx.org/privkey.pem;

    root /var/git;

    location ~ ^/ac/(.+?)(\.git)?/(HEAD|info/refs|objects/info/.+|objects/([0-9a-f]{2}/[0-9a-f]{38}|pack/pack-.*))$ {
        include fastcgi_params;
        fastcgi_param SCRIPT_FILENAME /usr/libexec/git-core/git-http-backend;
        fastcgi_param GIT_HTTP_EXPORT_ALL "";
        fastcgi_param GIT_PROJECT_ROOT /var/git;
        fastcgi_param PATH_INFO /$1.git/$2;
        fastcgi_pass unix:/run/fcgiwrap.socket;
    }

    location ~ ^/ac/(.+?)\.git$ {
        return 301 /ac/$1.git/info/refs?service=git-upload-pack;
    }
}
```

Include it from the main nginx config:

```
ln -s /etc/git-ro/nginx-git-ro.conf /etc/nginx/conf.d/git-ro.conf
nginx -t && rc-service nginx reload # Gentoo
```

**Read-only guarantee:** do **not** enable receive-pack; only git-upload-pack (clone/fetch) is exposed. Push stays on git://f0xx.org (SSH or authenticated path), not this vhost.

Test anonymous clone:

```
git clone https://git-r.f0xx.org/ac/ac-docs.git /tmp/ac-docs-ro-test
```

#### 5) Mark public repos for anonymous HTTPS read

For each bare repo that may be cloned without a token:

```
GIT_ROOT=/var/git
repo=ac/ac-docs
touch "${GIT_ROOT}/${repo}.git/git-daemon-export-ok"
git -C "${GIT_ROOT}/${repo}.git" config http.receivepack false
git -C "${GIT_ROOT}/${repo}.git" config http.uploadpack true
```

Repeat for every Appendix A row you want world-readable over HTTPS.

#### 6) Optional — require token for private HTTPS read

Add HTTP basic auth for selected locations. Store credentials **outside** AndroidCast:

```
install -d -m 0750 /etc/git-ro/htpasswd
htpasswd -c /etc/git-ro/htpasswd/ro-ci-user
```

In /etc/git-ro/nginx-git-ro.conf, inside the location block for smart HTTP:

```
auth_basic "git read-only";
auth_basic_user_file /etc/git-ro/htpasswd/ro-users;
```

Clone with token (password = token):

```
git clone https://ro-ci-user:<TOKEN>@git-r.f0xx.org/ac/ac-ms-identity.git
```

#### 7) Token-wise permissions (outside AndroidCast)

Keep a simple ACL file per token under /etc/git-ro/tokens/ — **not** referenced by android\_cast code:

```
install -d -m 0700 /etc/git-ro/tokens
cat > /etc/git-ro/tokens/ci-read-issues.env <<'EOF'
ac/ac-ms-issues
ac/ac-be-issues
ac/ac-platform-php
EOF
chmod 0600 /etc/git-ro/tokens/*.env
```

Enforcement options (pick one on the git server):

- **Simple:** separate htpasswd users per token + nginx location blocks per repo prefix.
- **Scalable:** small git-ro-auth script (not in AndroidCast repo) consulted by nginx\_request.

AndroidCast **never** reads /etc/git-ro/; CI machines hold tokens in their own secret stores.

#### 8) Certbot renewal (crontab)

Edit root crontab on the git server:

```
crontab -e
```

Add:

```
17 3 * * * certbot renew --quiet --deploy-hook "nginx -t && rc-service nginx reload"
```

Or install a one-shot renew script /etc/git-ro/certbot-renew.sh:

```
#!/bin/sh
set -eu
certbot renew --quiet
nginx -t
rc-service nginx reload
chmod 0755 /etc/git-ro/certbot-renew.sh
crontab -e
17 3 * * * /etc/git-ro/certbot-renew.sh >> /var/log/git-ro-certbot.log 2>&1
```

## 9) Client remote examples

| Use case                         | Remote URL                                                             |
|----------------------------------|------------------------------------------------------------------------|
| Developer push/fetch (canonical) | git://f0xx.org/ac/ac-mobile-android                                    |
| Anonymous read (HTTPS)           | https://git-r.f0xx.org/ac/ac-docs.git                                  |
| Token read (HTTPS)               | https://<user>:<token>@git-r.f0xx.org/ac/ac-ms-issues.git              |
| Browse HTML (optional)           | https://apps.f0xx.org/app/androidcast_project/git/ (Gitea mirror only) |

Do **not** document <https://f0xx.org/>... as a git smart HTTP endpoint; landing stays human/PDF only.

## 10) Verification checklist

```
curl -sSI https://git-r.f0xx.org/ac/ac-docs.git/info/refs?service=git-upload-pack | head
```

```
git ls-remote git://f0xx.org/ac/ac-docs
```

```
git clone https://git-r.f0xx.org/ac/ac-docs.git /tmp/ro-clone-test
cd /tmp/ro-clone-test && git push origin HEAD # must fail on this vhost
```

## 14. Related documents

| Document                                   | Role                                            |
|--------------------------------------------|-------------------------------------------------|
| DRs/20260618_repos_reorganizing.md         | Frozen design review R1.1 (source of this SPEC) |
| INFRA.md                                   | FE/BE topology, ports                           |
| BUILD_DEPLOY.md                            | Session cookie, deploy paths                    |
| specs/20100612_1_scaling.md                | VM roles, cluster layout                        |
| orchestration/sim/cluster0/ARCHITECTURE.md | Lab cluster                                     |
| OPEN_TASKS_GRAPH.md                        | Task dependencies                               |

## 15. Changelog

| Rev  | Date       | Change                                                                                        |
|------|------------|-----------------------------------------------------------------------------------------------|
| R1   | 2026-06-22 | SPEC converted from frozen DR R1.1; normative requirements §3; migration §9; verification §12 |
| R1.1 | 2026-06-22 | Submodule policy §4.3: only third-party/* + backend/url-shortener                             |