

Remote access — implementation notes (v1 WireGuard)

WireGuard v1 — implementation and deploy

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Source: `REMOTE_ACCESS_IMPL.md` — section links work in PDF viewers that support internal anchors.

App (developer settings)

- Dropdown: **Disabled** | **WireGuard** (lab) | **RSSH** (alpha — outbound reverse SSH, no VPN)
- **VPN routing (WireGuard only)**: route scope **Hub only** (172.200.2.1/32, split tunnel) or **All traffic** (0.0.0.0/0); app scope **All apps** or **This app only** (IncludedApplications / VpnService.addAllowedApplication). RSSH ignores these. Prefs sent on heartbeat as vpn_route_scope / vpn_app_scope; changing them reconnects an active WG session.
- Pref key: dev_remote_access_mode (AppPreferences)
- **Disabled**: notifies BE (status:disable), tears down VPN, stops RemoteAccessService
- **WireGuard**: foreground service; jittered poll **1–7 min** → heartbeat.php with type: ra
- Heartbeat URL derived from crash upload URL (.../api/heartbeat.php)
- Session credentials persisted until expires_at; expiry tears down tunnel locally
- Userspace WG via third-party/wireguard-android (:tunnel / GoBackend) in isolated process com.fox.androidcast:vpn; main app controls via AIDL (IVpnService / VpnServiceClient); TUN fallback only if GoBackend fails

Android VPN consent (WireGuard)

WireGuard on Android **must** use VpnService (see DeveloperSettingsActivity → VpnService.prepare()). This is **not avoidable** on stock devices:

UX	WireGuard (v1, lab)	RSSH (alpha essential)
One-time system dialog	Yes — “Allow VPN?”	No VPN permission
Status-bar key icon	Yes while tunnel up	No
Full-device routing	TUN interface (split routes in config, still a VPN)	No L3 tunnel
Outbound from phone	UDP to BE : 45340	HTTPS poll + outbound SSH to bastion

There is no supported “hidden VPN” on non-root Android: any TUN creator is classified as a VPN app. **RSSH** (foreground service + existing HTTPS poll + outbound SSH reverse tunnel) is the **alpha deliverable** agreed by project owners — device initiates, operator reaches a forwarded port on the bastion, without VPN consent or status-bar key. See Rev. 3 Q&A and ROADMAP.md § Remote access.

Uses the **existing crashes vhost** — no new nginx location blocks for HTTP.

Piece	Path
Migration	sql/migrations/007_remote_access.sql
Repository	src/RemoteAccessRepository.php
WG peers	src/WireGuardPeerProvisioner.php (wg set wg0 peer ...)
Device API	public/api/heartbeat.php (type: ra)
Admin API	public/api/remote_access.php
UI	?view=remote_access (nav + hub card)
RBAC	remote_access_view, remote_access_operate, remote_access_admin
RBAC admin UI	?view=rbac — global roles (root), company roles, privilege sets
Cron	scripts/purge_remote_access.php (hourly recommended)

RBAC rules (enforced in API)

Permission	Scope
remote_access_view	List devices/sessions/events in allowed companies
remote_access_operate	Open session; close own sessions
remote_access_admin	Whitelist devices; close any session in company
Global admin / root	All companies; root edits global roles via ?view=rbac

Privilege sets (remote_access_user, remote_access_admin) on company_memberships.permissions_json grant extra actions to member rows — see crash console README § RBAC.

Flow

1. Device polls with {type:ra, status:enable, capabilities:[wireguard], tunnel_mode:wireguard}.
2. BE upserts remote_access_devices; returns wait until device is **whitelisted** and operator **opens session**.
3. Next eligible poll returns action:connect + ephemeral WG credentials; BE runs wg set when provision_peers=true.
4. Disable from app → status:disable → closes sessions, removes peers.

URLs (production)

- Dashboard: https://apps.f0xx.org/app/androidcast_project/crashes/?view=remote_access
- Heartbeat: .../crashes/api/heartbeat.php
- Admin API: .../crashes/api/remote_access.php

Production deploy (no new nginx HTTP paths)

After syncing PHP/JS to the BE tree under

.../androidcast_project/android_cast/examples/crash_reporter/backend/:

1. Database

Migration **007** (already applied on prod per deploy notes). Tables auto-create on SQLite dev; MariaDB should use the migration file once as root.

2. config.php — required keys

```
'remote_access' => [
    'wg_endpoint' => 'ra.apps.f0xx.org:45340', // public UDP hostname:port (FE DNAT → BE)
    'wg_server_public_key' => '...',          // wg show wg0 public-key on BE — REQUIRED
    'wg_interface' => 'wg0',
    'provision_peers' => true,                 // wg set on connect/close
    'require_wg_tools' => true,               // reject connect if wg genkey missing
    'session_ttl_s' => 3600,
    'min_poll_interval_s' => 45,             // poll rate limit per device
],
```

Critical: wg_server_public_key must match the live wg0 interface. Empty value makes connect credentials unusable on real devices.

3. BE packages and permissions

```
apk add wireguard-tools wireguard-tools-wg
```

```
sudo -u www-data wg show wg0
```

4. Cron (session cleanup)

```
0 * * * * cd /var/www/.../backend && php81 scripts/purge_remote_access.php --hours=24
```

Use php81 when Alpine default php is 8.5+ without the session module; FPM is php-fpm81.

5. Verify

```
cd examples/crash_reporter/backend
chmod +x scripts/ra_*.sh scripts/verify_remote_access_prod.sh scripts/test_remote_access_api.sh
./scripts/verify_remote_access_prod.sh
BASE=https://apps.f0xx.org/app/androidcast_project/crashes ./scripts/test_remote_access_api.sh
BASE=https://apps.f0xx.org/app/androidcast_project/crashes ./scripts/ra_e2e_cli.sh
```

Linux CLI device simulator (same heartbeat payloads as the app): REMOTE_ACCESS_VALIDATION.md.

6. Browser

Hard-refresh after deploying public/assets/js/remote_access.js.

WireGuard data plane (UDP, not nginx)

HTTP control plane stays on FE→BE :80. **WireGuard traffic is UDP** — configure at the **FE firewall/DNAT**, not in nginx:

Internet UDP :45340 → FE DNAT → BE wg0 :45340

Hostname ra.apps.f0xx.org (or similar) should resolve to the FE public IP. Devices use wg_endpoint from config/connect payload.

VPN process (AIDL)

Component	Process	Role
VpnServiceClient	main (com.foxx.androidcast)	Binds to IVpnService; async apply/tearDown + state callbacks
AndroidCastVpnService	:vpn	AIDL stub; worker thread for tunnel ops
WireGuardVpnEngine	:vpn	GoBackend + TUN fallback
RemoteAccessVpnService	:vpn	VpnService TUN when GoBackend fails
GoBackend\$VpnService	:vpn	WireGuard tunnel library VPN entry (manifest merge)

Developer settings still uses VpnService.prepare(Activity) for the one-time consent dialog (same app UID).

Crash capture: CrashReporter.install() registers uncaught handlers in :vpn (scenario vpn_service, process com.foxx.androidcast:vpn). Reports persist to shared app storage and upload via :crashwatcher. Lab: scripts/simulate-vpn-crashes.sh (debug APK + MODE=device, or MODE=upload for BE ingest validation).

WireGuard third-party (Android)

```
bash scripts/init-third-party-submodules.sh # or ./rebuild.sh (includes init + :tunnel build)
./gradlew :tunnel:assembleDebug :app:assembleDebug
```

Gradle fails fast if the submodule is missing. VPN runs in :vpn (AndroidCastVpnService + AIDL); WireGuardVpnEngine uses GoBackend with TUN fallback in the same process.

RSSH alpha (reverse SSH)

Layer	Component	Notes
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App	ReverseSshTunnelBridge	JSch outbound -R 127.0.0.1:<port>:127.0.0.1:8022
App	RsshLocalSshServer	Apache MINA SSHD on 127.0.0.1:8022
BE	RsshSessionProvisioner / RsshBastionProvisioner	DB creds; optional Linux user via rssh_bastion_user.sh
FE	nginx stream	nginx/rssh-bastion-stream.conf.example
Sim	examples/rssh/linux-sim/	Laptop heartbeat + ssh -R

Developer settings → **RSSH** (no VPN dialog). Operator command shown in admin active sessions.

RA control HTTP (:ra_control)

Isolated process: template web UI + sandbox shell when RA session is up. Port/token in adb.json ra_control block.

Tests

```
./gradlew :app:testDebugUnitTest --tests 'com.foxx.androidcast.remoteaccess.*'
bash examples/crash_reporter/backend/scripts/test_rssh_unit.sh
bash examples/crash_reporter/backend/scripts/test_rssh_api.sh
bash examples/crash_reporter/backend/scripts/test_remote_access_api.sh
BASE=https://apps.foxx.org/app/androidcast_project/crashes bash examples/crash_reporter/backend/scripts/test_remote_access_api.sh
BASE=https://apps.foxx.org/app/androidcast_project/crashes bash examples/crash_reporter/backend/scripts/ra_e2e_cli.sh
```

CLI validation guide: REMOTE_ACCESS_VALIDATION.md.