HAProxy Server Pools

Overview & concepts

What is an HAProxy pool?

An HAProxy pool is a ServerCTL deployment preset for the edge tier: public DNS, one or more enrolled Linux VMs running HAProxy, and optional automatic promotion when the active host fails.

ServerCTL is the control plane. It does not terminate customer traffic itself. It:

- Enrols VMs via the ServersCTL agent
- Publishes a managed A record through Cloudflare or cPanel/WHM
- Tracks heartbeats (~1s check-ins) and systemd HAProxy health
- Queues remote jobs (install, reload, backup, drain) that run on the next heartbeat

Status: HAProxy pools are well tested and in public beta.

Core terminology

Term	Meaning
Pool	One site/deployment in the dashboard
Member	One enrolled VM (node) with hostname, allowed egress IP, and enrollment secret
Active member	The host whose IPv4 the managed DNS A record points at
Standby	Enrolled member not currently receiving DNS traffic
Failover hostname	Public FQDN clients use (e.g. `lb.example.com`)
Member template	Role at enroll time — for HAProxy pools use HAProxy balancer

Architecture (high level)

Clients → DNS (Cloudflare / cPanel) → A record → Active HAProxy VM
↑
ServerCTL Worker updates DNS
↑
Standby HAProxy VMs ← agent heartbeats + jobs

Health for failover: A member is unhealthy when:

1. No heartbeat within the failover delay window (10–120 seconds), or
2. HAProxy is monitored, and systemd reports HAProxy inactive

> Important: Clients must use the failover hostname, not a member’s raw IP. ServerCTL moves the A record; your apps keep the same DNS name.

What HAProxy pools include vs other presets

HAProxy pools uniquely enable:

- Remote HAProxy jobs (install, reload, backup)
- HAProxy systemd probe on member cards
- Disaster Recovery tab (cross-member restore, 2+ members)
- Traffic-flow diagram on Overview
- HAProxy Status tab

Generic Linux pools hide HAProxy-specific jobs unless the agent detects HAProxy on the host.

Create your first pool & Enroll your first member

Create your first pool

Step 1 — Add pool

1. Go to Pools → Add pool
2. Choose the HAProxy template
3. Name the pool (e.g. `production-edge`)
4. After create, you land in the pool with a setup banner

Step 2 — Connect DNS (Settings)

ServerCTL needs API access to authoritative DNS to create/update the failover A record.

Cloudflare

- API token: Zone · DNS · Edit (+ zone read)
- Cloudflare Account ID
- Select the zone that will host your public hostname

cPanel / WHM

- WHM hostname and port (usually 2087 or 443)
- WHM username + API token
- Zone domain (apex), e.g. `example.com`

You can save reusable Cloudflare credentials under Settings → API providers and link them to pools without re-entering tokens.

Step 3 — Enrol the first member

On Overview → Add member:

Field	Notes
Member template	HAProxy balancer
Hostname	Must match JSON `hostname` from the agent; set `BALCTL_HOSTNAME` on the VM if OS hostname differs
Allowed source IPs	VM outbound IPv4 to `serversctl.com` (egress), not necessarily SSH address

After creating, copy the one-shot install command **immediately and run it in the HAProxy Server** — the enrollment secret is shown once.

The command:

- Downloads the agent bundle
- Runs `balctl-agent.sh --enrol --key … --hostname …`
- Writes `/etc/balctl/agent.env`
- Installs and starts `balctl-heartbeat.service`

Within a few seconds, the member tab should show a green heartbeat.

Step 4 — Set the public failover hostname

Settings or Managed DNS tab:

- Set DNS label (e.g. `lb` → `lb.example.com`)
- Choose orange-cloud (proxied) vs DNS-only as needed
- On Overview, Make active on the member that should receive traffic

Step 6 — Add a standby (High Availability)

Repeat enrollment on a second VM. Enable Automatic failover in Settings when ready for unattended promotion.

Pool workspace (Overview, Settings, DNS, DR, Monitoring)

Pool workspace

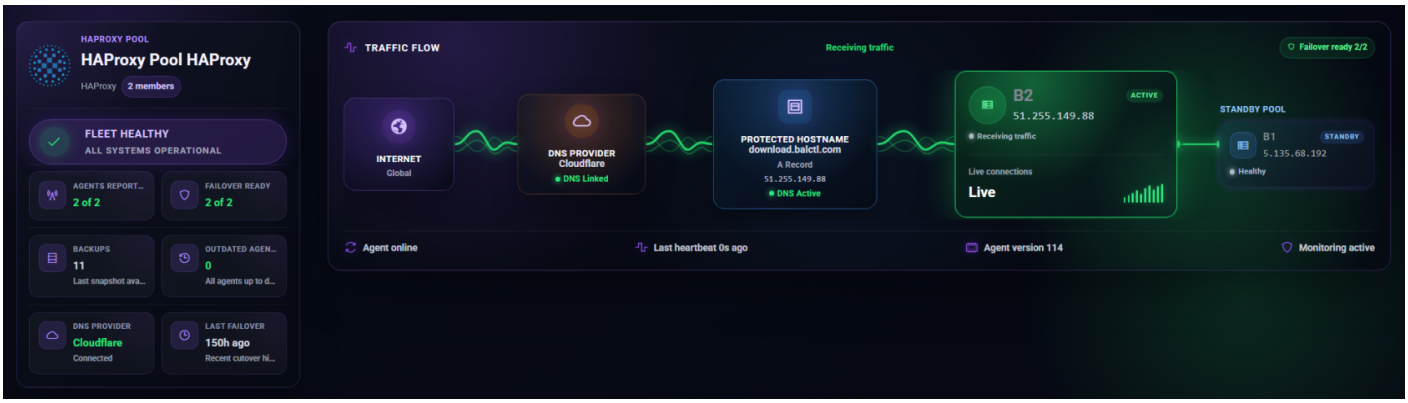
The pool page has a tab bar with three groups:

1. Overview (pool home)
2. Member tabs (one per enrolled host)
3. Pool tools (DR, Monitoring, Settings, Managed DNS)

Overview tab

For HAProxy pools, Overview answers:

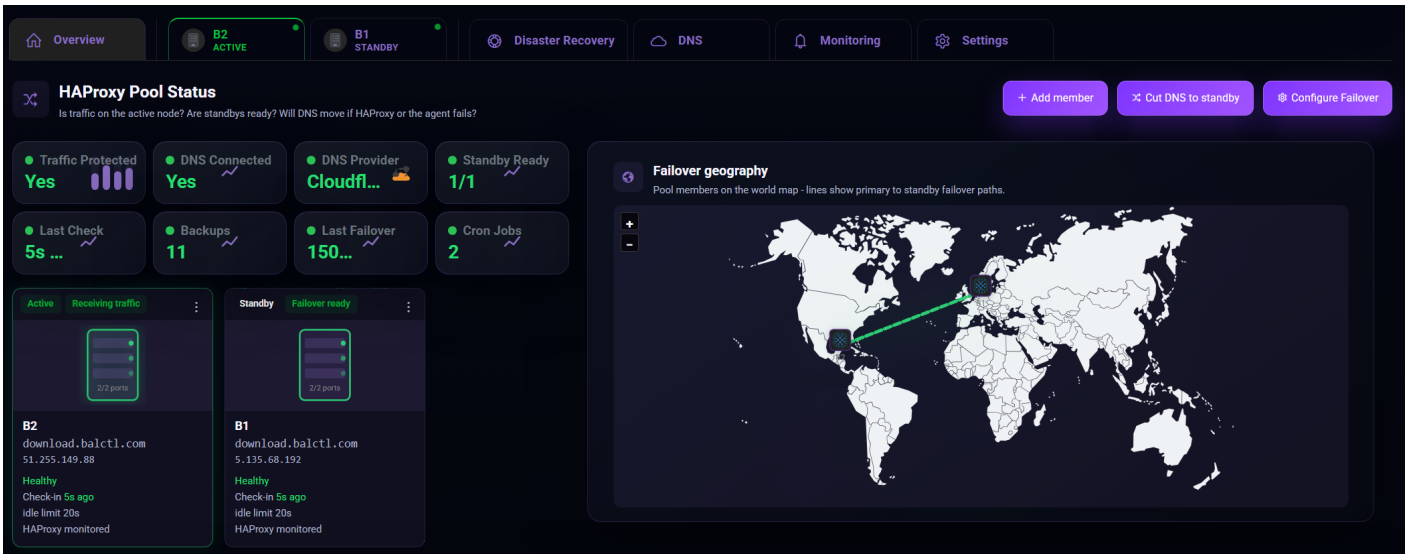
- Is traffic on the active node?
- Are standbys ready?
- Will DNS move if HAProxy or the agent fails?



Hero panel: Traffic-flow diagram — Cloudflare/DNS → active HAProxy → standbys.

Actions:

- Add member
- Cut DNS to standby — manual DNS cutover to next ready standby (requires connected DNS)
- Settings shortcut



KPI tiles: healthy members, failover-ready count, backups, cron jobs, last failover time.

Member cards show Active vs Standby, heartbeat state, and Make active on standbys.

Settings tab

Section	Purpose
Pool name	Rename the pool
API providers	Cloudflare credentials, WHM links
Balancer failover	Auto-failover toggle, recovery time (10–120s)
Remove pool	Destructive — deletes pool and related data

Failover hostname, proxied vs DNS-only, and Dynamic DNS sync live on the Managed DNS tab (not only Settings).

Managed DNS tab

- Failover DNS label and FQDN preview
- Orange cloud vs DNS-only
- Dynamic DNS sync — optional; updates A record when active member’s public IPv4 changes on heartbeat

- DNS connectivity test
- Current A record target IP

Disaster Recovery tab

Visible when the pool has 2+ members (HAProxy preset only).

Cross-member restore: Pick a target member, choose a snapshot from another host’s backups, restore scoped HAProxy files onto the target.

> Requires Pro or active trial for cross-member restore.

Monitoring tab

Pool-wide alert settings and failover notification preferences (email when auto-failover promotes a standby).

Per-member monitoring is under each member’s Monitoring tab.

Protection tab

Only appears when 2+ cPanel members exist — not core HAProxy-only pools. Document separately if you mix cPanel hosts into an HAProxy pool.

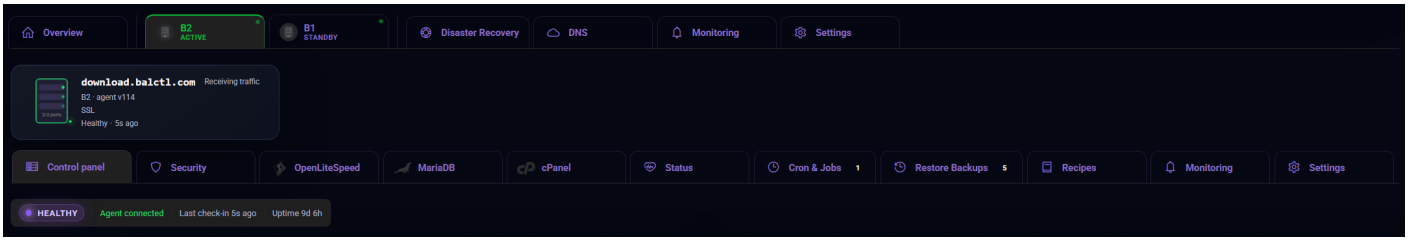
Pool members & enrollment

Member tab layout

Click a member in the tab bar to open its workspace. Sub-tabs:

Tab	Purpose
Control panel	Host ops: reboot, updates, hostname, TLS domain (non-HAProxy PEM)
Security	UFW firewall, SSH enable/disable, firewall backup
Status	Live HAProxy traffic stats from heartbeat (`show stat`)
Cron & Jobs	Scheduled tasks + job timeline
Restore Backups	List snapshots, scoped backup/restore
Recipes	One-click enable flows (admin socket, SSH, Let’s Encrypt, agent update)
Monitoring	Member-level alert thresholds
Settings	Display name, hostname, allowed IPs, geo, remove member

HAProxy-specific Management actions (install, reload, drain, TLS failover) are surfaced on Control panel and via Recipes — the dedicated HAProxy tab exists in code but is hidden until product-ready.



Enrollment security model

Each heartbeat must satisfy:

1. Bearer token — 48-character enrollment secret (hashed in D1)
2. `CF-Connecting-IP` — must match allowed source IP(s)

3. JSON `hostname` — must match enrolled hostname

Mismatch → 403 (IP) or credential errors.

Agent environment

Variable	Purpose
`BALCTL_API_BASE`	Worker URL (e.g. `https://serversctl.com`)
`BALCTL_ENROLLMENT_SECRET`	From Add member modal
`BALCTL_HOSTNAME`	Override OS hostname
`BALCTL_DECLARE_IP`	Declare public IPv4 in heartbeat
`BALCTL_PROBE_PUBLIC_IP=1`	Probe public IP if not declared

Agent runs as root for HAProxy install, backup/restore, admin socket, and cert writes.

DNS failover & traffic cutover

Manual cutover

Make active on a standby member → ServerCTL sets it as primary and updates the managed A record to its public IPv4.

Cut DNS to standby on Overview → promotes next failover-ready standby (same DNS update, overview-oriented workflow).

Automatic failover

Enable in Settings → Balancer failover.

When enabled, ServerCTL periodically evaluates the active member. Promotion triggers when:

- Heartbeat age exceeds failover delay, or
- HAProxy is monitored and inactive

A healthy standby is promoted; DNS is updated; optional email alert fires.

Failover delay

Setting	Range
Recovery time	10–120 seconds

Setting	Range
Community (free)	Fixed at 120s
Pro / trial	Faster presets (e.g. 10s, 30s)

Agents' heartbeat independently (~1s); failover delay is not the heartbeat interval.

Failover-ready criteria

A standby is ready when:

- Recent heartbeat within the failover window, and
- HAProxy is not down (when monitored)

Dynamic DNS Sync

Optional for HAProxy pools when the active member’s WAN IPv4 changes (DHCP/ISP churn). Each heartbeat can push the new public IP to Cloudflare without manual DNS edits.

Proxied vs DNS-only

- Orange cloud (proxied): Traffic through Cloudflare; good for HTTP/S when origin IP hiding matters.
- DNS-only (grey cloud): Clients connect directly to member IPv4 — required for raw TCP services (e.g. non-HTTP on custom ports).

HAProxy operations

Install & lifecycle

Action	Command ID	Notes
Install HAProxy	`haproxy.provision`	Fresh VM
Re-install	`haproxy.provision` + `force: true`	Overwrite install path
Reload	`haproxy.reload`	After config edits
Provision standby from backup	`standby.provision_from_backup`	Clone config from backup onto standby

Jobs are enqueued to the API; the agent claims and runs them on the next heartbeat.

Admin stats socket (drain / ready)

Runtime backend control requires a Unix admin socket in `haproxy.cfg`:

```
stats socket /run/haproxy/admin.sock mode 600 level admin expose-fd listeners
stats timeout 2m
```

Enable via Recipe: Enable HAProxy admin stats socket or Enable admin stats socket action.

Requires socot + agent as root. This is not a public HTTP stats page.

Backend server states

From Management/topology table:

Action	Command ID	HAProxy runtime
Drain	`haproxy.server_drain`	`set server … state drain`
Ready	`haproxy.server_ready`	`state ready`
Maintenance	`haproxy.server_maint`	`state maint`

TLS (Let’s Encrypt on HAProxy)

Recipe: Let’s Encrypt (failover / HAProxy)

- Uses DNS-01 via Cloudflare for the pool failover FQDN
- Agent writes combined PEM: `/etc/haproxy/certs/<hostname>.pem`
- One-time operator step: add `ssl crt /etc/haproxy/certs/<hostname>.pem` in config, validate, reload
- Renew from Management or cron preset `tls.acme_renew_force`

The pool must have Cloudflare linked and a failover label set before the recipe applies.

Status tab

Shows live traffic from agent heartbeat enrichment — not a duplicate of the Overview topology diagram. Use for session rates, backend health columns, etc.

Backups & disaster recovery

What gets backed up

HAProxy backup job captures:

- `/etc/haproxy/haproxy.cfg` and `conf.d/*.cfg`
- `/etc/haproxy/certs/*`
- Let’s Encrypt material under `/etc/letsencrypt/`
- Paths referenced by `ssl crt` in config under `/etc/`
- Optional UFW rules (`backup.ufw`) — separate job

Storage: Per member S3.

Path pattern:

/{userId}/sites/{siteId}/snapshots/{snapshotId}/

Restore flows

Same member: Restore Backups tab → pick snapshot → scoped restore → agent validates with `haproxy -c` → reload.

Cross-member (DR tab): Restore another member’s snapshot to a target VM — typically after an outage or a bad config push.

Fresh VM rebuild:

1. Enrol new/replacement member
2. Optional: Install HAProxy
3. Restore snapshot
4. Make active when ready

Standby provisioning

Provision standby from backup clones, HAProxy config from a backup onto a standby host — faster than manual copy for DR drills.

Recipes & scheduled jobs

Recipes (member → Recipes tab)

Recipe	When
Enable HAProxy admin stats socket	HAProxy detected
Enable SSH access	Always available
Let’s Encrypt (failover / HAProxy)	HAProxy + Cloudflare + failover FQDN
Update agent	When agent version outdated

Recipes show steps, completion state, and optional disable actions (e.g. remove admin socket lines).

Cron & Jobs tab

Control-plane cron (UTC) enqueues jobs on the next agent heartbeat.

Common presets:

- HAProxy backup
- `haproxy.reload`
- TLS force renew
- `failover.evaluate` (pool-level failover check)

Separate from per-member backup schedule on Restore Backups — both can exist.

Job timeline

All agent jobs appear in Cron & Jobs with status: pending → running → completed/failed. Remote actions from Overview cards also enqueue here.

Agent reference

Heartbeat payload (HAProxy-relevant)

The agent sends JSON including:

- `ip` — declared/probed IPv4
- `hostname`
- `haproxy` block — monitored, active, topology, listeners, optional `show stat` summary

ServerCTL validates IP against enrollment and stores the latest row per node.

CLI essentials

```
sudo balctl_heartbeat.py --version
sudo balctl_heartbeat.py --provision-haproxy # local install
sudo balctl_heartbeat.py --update # from configured agent.zip URL
sudo journalctl -u balctl-heartbeat.service -f
```

Job loop

1. `POST /api/agents/heartbeat`
2. Server returns pending jobs
3. Agent executes, posts `POST /api/agents/jobs/complete`

Full agent docs: `agents/README.md` in the repo.

Troubleshooting & FAQ

Symptom	Likely cause	Fix
403 on heartbeat	Wrong allowed IP or hostname	Update allowed IPs; set `BALCTL_HOSTNAME`
401 unknown credential	Used member UUID instead of enrollment secret	Re-enroll; use 48-char secret from modal
No HAProxy on card	No config / unit not detected	Install or ensure `/etc/haproxy/haproxy.cfg` exists
Drain buttons missing	No admin socket	Run admin socket recipe
Backup shows · D1 not · R2	R2 not bound when backup ran	Fix Worker binding; run new backup
Auto-failover didn’t run	Only one member, auto off, or no healthy standby	Add standby; enable auto; check readiness
DNS didn’t update	DNS not connected, private IP in heartbeat, label unset	Connect provider; use public IPv4; set label
Let’s Encrypt recipe greyed out	No Cloudflare or no failover FQDN	Complete DNS setup first

Support bundle: If contacting support, include the pool name, member hostname, `journalctl` excerpt, screenshot of member health badge.

Appendix — Plan gating (for operators)

Feature	Community	Pro / trial
Failover delay	120s only	10s–120s
Cross-member DR restore	Locked	Available
Premium DNS/provider modals	Gated	Available