

RTS RVOC Cloud Intercom

RVOC Cloud Intercom



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1 RVOC Engine product overview

RVOC Engine offers flexibility and scalability, accommodating the dynamic needs of sports, news productions, live events and distributed multi-location productions. It is a pivotal tool in facilitating real-time collaboration and coordination, allowing teams to communicate updates, receive instructions, and seamlessly coordinate live cues.

RVOC Edge mobile phone app, serves as a virtual key panel, providing mobility and accessibility to communicate remotely and while on the move.

An authorized user must create the intercom cloud instance using AWS. RVOC Engine, deployed by a cloud administrator on your AWS account, is generated from the installer package provided by the RVOC Elevate owner. Once the setup is complete, the cloud administrator transfers the maintenance responsibilities of RVOC Engine to the Intercom Administrator.

Use RVOC Engine to:

- Manage licenses
- Create and manage users
- Create and manage connections

Typically, deployments are Cloud Only intercom deployments, which are connected through Trunking, Hardware Keypanels and Virtual Key panels with users or hybrid deployments which utilize the cloud to scale existing intercom installations.

2 RVOC Engine deployment overview

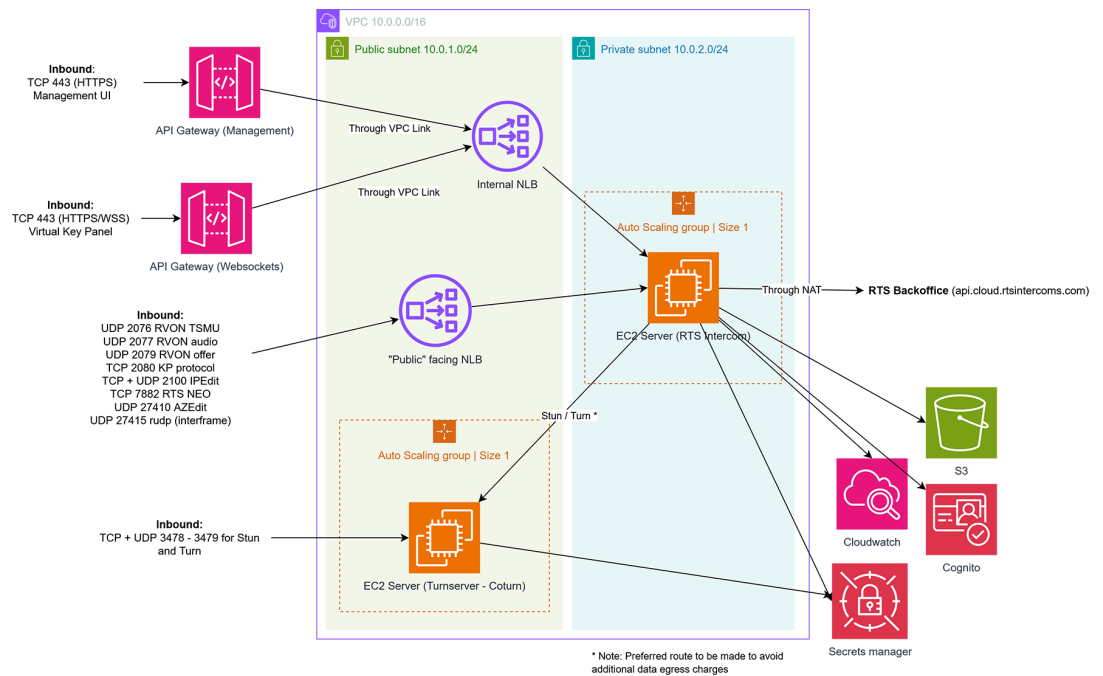
When deploying RVOC Engine, we support two deployment types:

- Essential
- High Availability

Essential

An Essential deployment exists in a single availability zone of choice within the AWS region. In this single availability zone, the RVOC Engine recovers from faults, but its recovery time is longer in comparison to a high availability deployment.

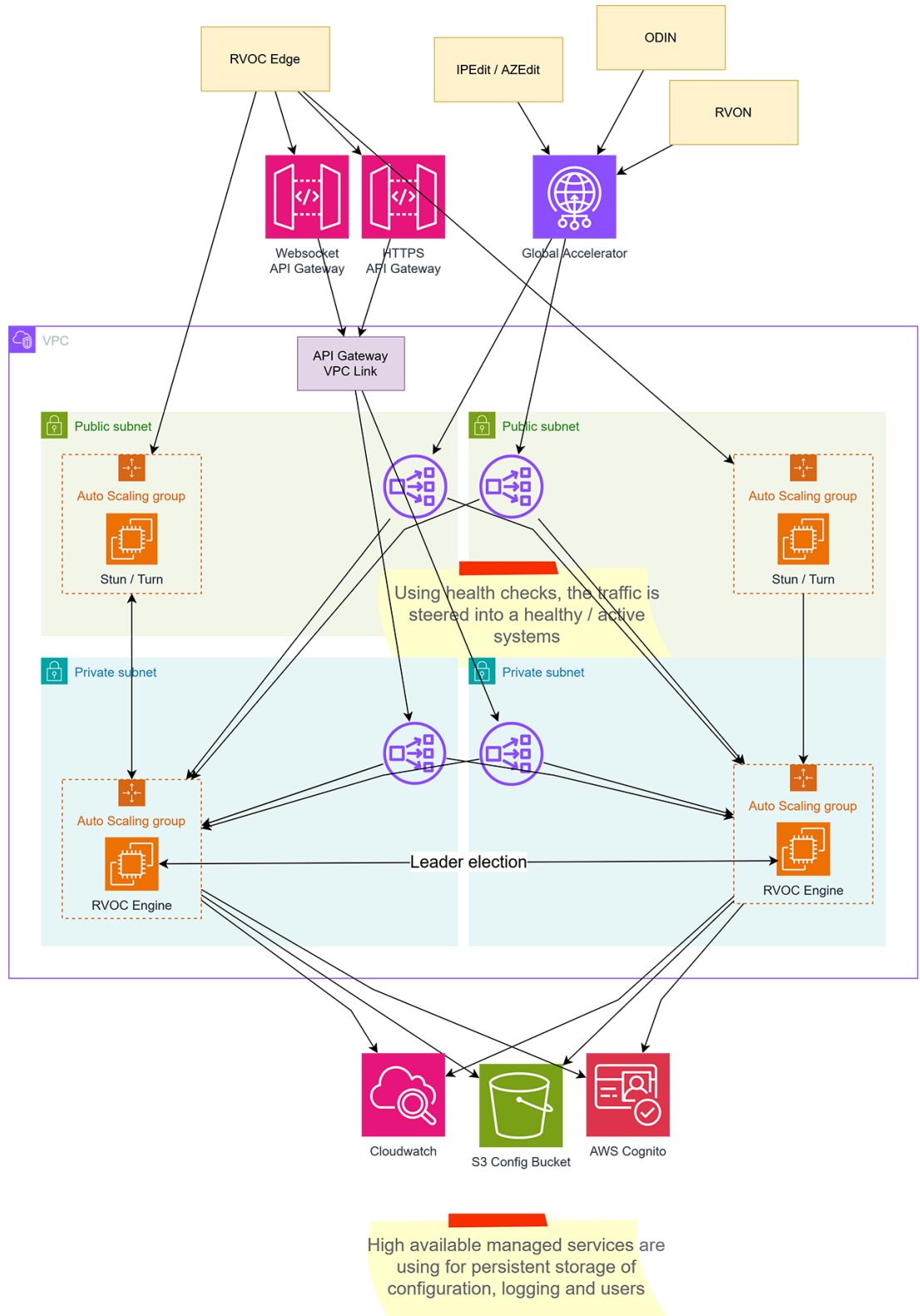
The following picture illustrates the infrastructure, including all ports used by it.



High Availability

A high availability deployment operates as an active/standby setup across two availability zones within the same AWS region. RVOC Engine automatically selects the optimal region to remain active based on the health of the infrastructure and software. When necessary, the full intercom fails over to the standby availability zone.

The following picture illustrates the infrastructure:



Notice!

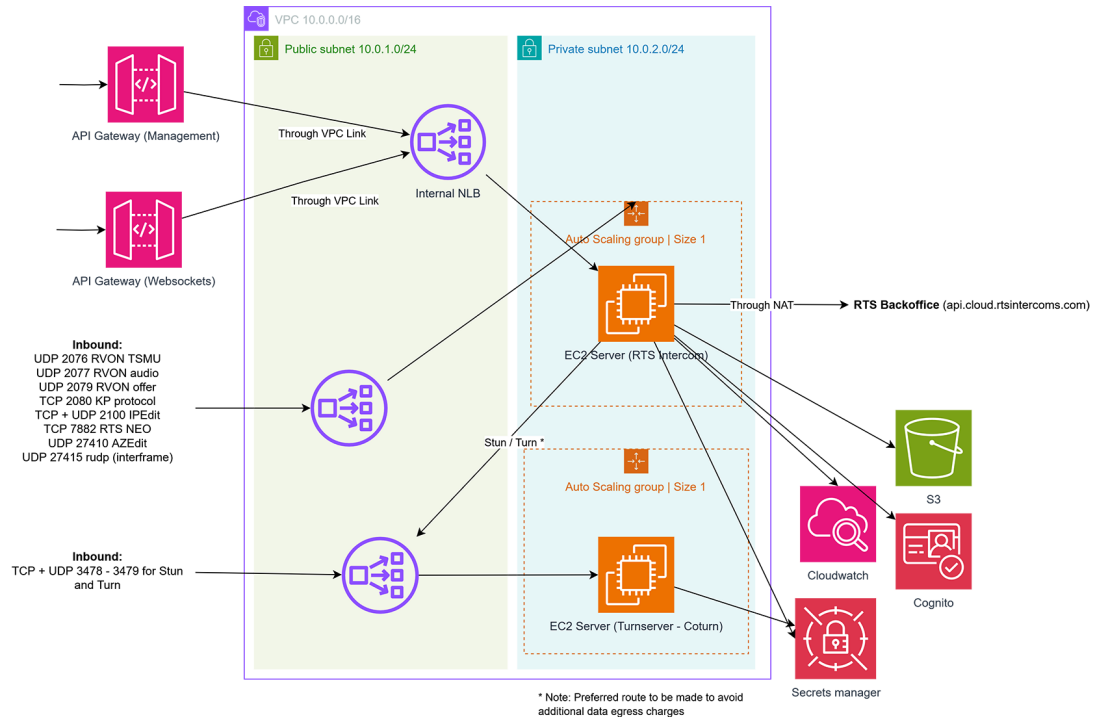
A high availability environment uses the same ports as an essential deployment.

2.1 Optional deployment functionality

Support for the following features comes standard with all deployment models.

Turn Server location

When required by IT policies, you can deploy the Turn Server in the private subnets. Take note, deploying the turn server in a private subnet may add some latency (e.g. a network hop), but allows additional network controls to increase the security.

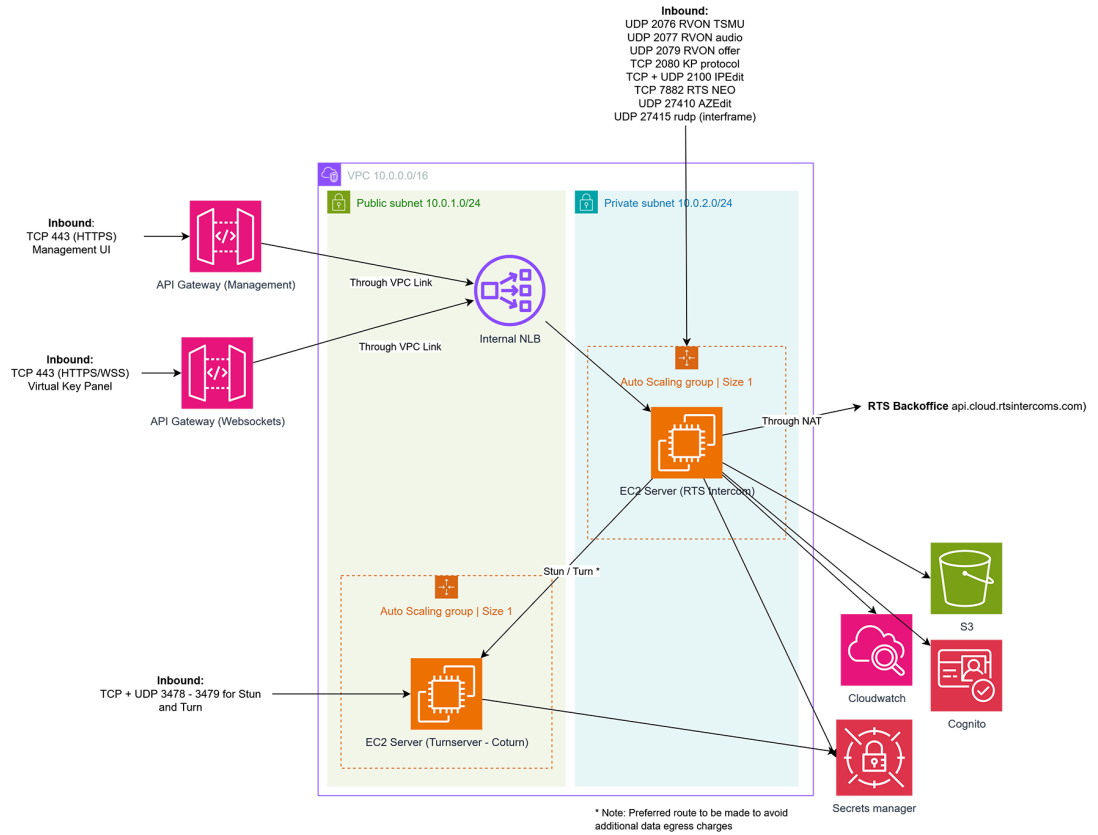


IPv6 support

When the VPC is IPv6 enabled, you can enable the Stun and Turn server with native IPv6 compatibility, this allows RVOC Edge devices with only IPv6 support to connect to the intercom.

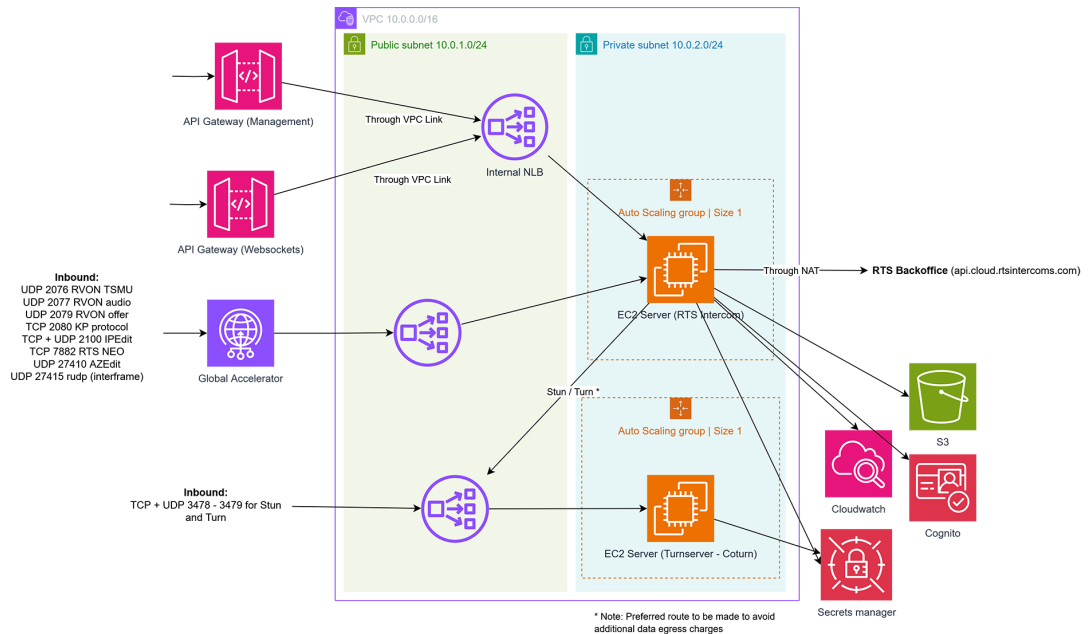
Direct Connect / VPN integration

The public hardware intercom termination points (e.g. AWS Network Load balancers) can be disabled which allows the hardware intercom termination points to be only accessed through a VPN service and/or AWS Direct Connect. Otherwise, the template allows you to setup an IP allow list for alternative security possibilities.



AWS Global Accelerator

While mandatory for high availability deployments and optional for essential deployments, AWS Global Accelerator can be enabled for hardware-based integrations. When enabled; global accelerator ensure the traffic between the cloud intercom and hardware devices to enter/leave the AWS network close to the location of the hardware devices which decreases the latency and improves the reliability of the network traffic.



Email Service integration (AWS SES)

RVOC Engine supports both HTTP and SMTP based integration with email services, allowing flexibility for integration

IMPORTANT: We highly encourage you to set up email integration for any production-type deployments. This setup allows you to send invitation emails with a One-Time Password, enable self-service password resets, and send system notifications such as license expiration emails.

DNS integration (Route 53)

RVOC engine allows you to integrate seamlessly with Route 53 (and AWS Certificate Manager) for custom DNS names.

2.2 Deployment considerations

RVOC Engine can be installed on any AWS data center / region that provides the required Amazon EC2 instance types (c8g, c7g or c6g) and the required managed AWS components (AWS API Gateway, Amazon S3, Amazon Cognito, AWS NLB) and network components (AWS VPC Link, AWS EIP).

Choose a region that is close to the physical location of your users to minimize latency. If your users are spread across multiple sites, select a location where the majority of your users are located.

RVOC Engine has built in technology to compensate for network latency and network jitter.

By default, the system selects the latest Ubuntu 24.04 AML as the base image. You can override the base image during deployment if you need any hardened images. If you choose hardened images, you are responsible for making any necessary performance tweaks in the monitoring tools.

2.3 Deployment pre-requisites

The following pre-requisites must be met before attempting to deploy the RVOC engine:

- AWS account (with administrator rights)
- VPC
 - One public subnet
 - One private subnet (with NAT Gateway / internet connectivity)
- At least 2 Elastic IP's available for a non-high available system (note that this might require an AWS Service limit increase)
- Minimum 1 iPhone device (iOS 16 or later)
- RTS Cloud formation template
 - The cloud formation will create the resources
- S3 bucket (Default settings) containing the installer file (RVOCEngine-Intercom-arm64-latest.deb or RVOCEngine-Intercom-ha-arm64-latest.deb) and its associated signature for validation (RVOCEngine-Intercom-arm64-latest.deb.sig or RVOCEngine-Intercom-arm64-ha-latest.deb.sig)
- Optionally: DNS (e.g. Route53) and an SSL certificate (in AWS ACM, SMTP server or AWS SES setup with production access)

**Notice!**

You do not need an RVOC Engine license to complete the installation. However, you must have a license to test the installation.

Skills to complete the deployment

The supplied CloudFormation template creates all the resources required for RVOC Engine to operate.

To perform the deployment, we advise you to seek guidance from your cloud administrator regarding the deployment options for the cloud infrastructure mentioned in the system architecture. Plan the VPC, subnets, email, and DNS integration before you deploy.

Generally, any AWS Certified DevOps engineer familiar with concepts such as VPC, S3, and CloudFormation can perform the deployment.

Time to complete deployment

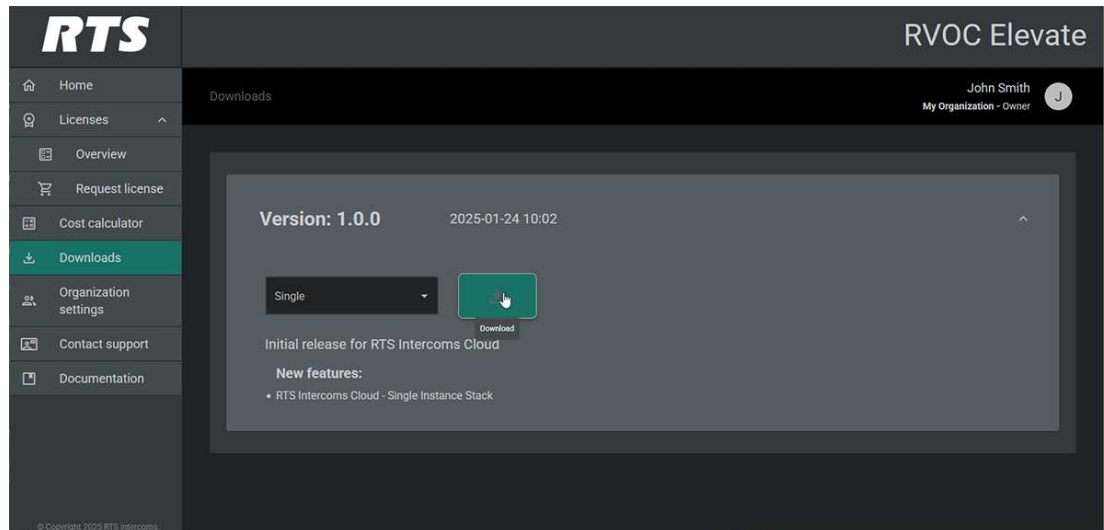
The deployment of the CloudFormation template takes around 10 minutes to complete.

3 Installation

3.1 Download the installer package

Before you can create RVOC Engine, you must download the installer package from RVOC Elevate at <https://cloud.rtsintercoms.com>.

1. Open RVOC Elevate.
2. Navigate to **Downloads**.



3. Select **Single** from the drop down menu.
4. Click the **Download** icon.
The system sends the installer package to your computer.

Package contents:

- **Intercom-core-single.json** - This template file is used with the AWS CloudFormation service. It provides the details of the AWS infrastructure as shown in RTS template.

For information on creating the S3 Bucket and uploading the installer files, refer to the Pre-Requisite guide.

3.2 Deploy the intercom

Deploying an intercom in the cloud includes configuring AWS, creating a stack, and ensuring secure connectivity between the cloud platform and the physical intercom.

1. Log in to **AWS**.
2. Navigate to CloudFormation.
3. From the Create stack menu, select **With new resources (standard)**.



4. Under Prepare template, select **Choose an existing template**.
5. Under Specify template, select **Upload the template file**.
6. Click **Choose file**.
7. Navigate to the **intercom core template.json** file.

CloudFormation > Stacks > Create stack

Step 1
Create stack

Step 2
Specify stack details

Step 3
Configure stack options

Step 4
Review and create

Create stack

Prerequisite – Prepare template
You can also create a template by scanning your existing resources in the [IaC generator](#).

Prepare template
Every stack is based on a template. A template is a JSON or YAML file that contains configuration information about the AWS resources you want to include in the stack.

☒ Choose an existing template
Upload or choose an existing template.

☐ Use a sample template
Choose from our sample template library.

☐ Build from Application Composer
Create a template using a visual builder.

Specify template info
A template is a JSON or YAML file that describes your stack's resources and properties.

Template source
Selecting a template generates an Amazon S3 URL where it will be stored.

☐ Amazon S3 URL
Provide an Amazon S3 URL to your template.

☒ Upload a template file
Upload your template directly to the console.

☐ Sync from Git
Sync a template from your Git repository.

Upload a template file
[Choose file](#)

intercom-core-single-high-available.template (8).json

JSON or YAML formatted file

S3 URL: [https://s3-us-east-1.amazonaws.com/cf-templates-xwnlkvukp3a-us-east-1/2024-10-09T180144.478Zee8-intercom-core-single-high-available.template\(8\).json](https://s3-us-east-1.amazonaws.com/cf-templates-xwnlkvukp3a-us-east-1/2024-10-09T180144.478Zee8-intercom-core-single-high-available.template(8).json)

[View in Application Composer](#)

Cancel **Next**

8. Click **Next**.
The Specify stack details screen appears.
9. Enter a **<stack name>**.
10. Fill in the necessary fields. See *CloudFormation fields*, page 33.

Specify stack details

Provide a stack name

Stack name

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 0/128.

Parameters
Parameters are defined in your template and allow you to input custom values when you create or update a stack.

General Settings

Stage
Stage identifier of the deployment, this will be added as a postfix to all resources created by the stack.

Asset Bucket Key
The S3 bucket name where the intercom installers are stored. Note that the bucket must provide access to the instances.

Sizing Configuration

Max Audio Connections
Number of audio connections. (Warning: This should be the MAXIMUM size as resizing will cause interruptions)

Override Instance Type
(Optional) Override the instance type. By default the instance type is determined by the number of audio connections.

11. Click **Next**.
12. Click **Next**.
13. Review the modifications.
14. Scroll down and select **I acknowledge that AWS CloudFormation might create IAM resource with customized names** check box located at the bottom of the page.
15. Click **Submit**.
It can take up to 10 minutes to create the resources.
The link to your cloud intercom is in the output of the stack setup.
16. Log into the intercom for the first time.

3.3

Log into the intercom for the first time

After completing the AWS stack creation, use the link from the Outputs section of the stack output to perform your initial login to the intercom.

**Notice!**

The first login to the intercom, by default, becomes the administrator of the intercom. You can add additional users with administrator rights after the initial login.

Perform an initial login

1. Click the **RTSManagementAPI** link that was created in the output stack in AWS.
The Welcome page appears.

**Notice!**

This URL allows you to connect through RVOC Edge in the absence of AWS SES (Amazon Simple Email Service). Additionally, system administrators may find this link useful for troubleshooting connectivity issues in the future.

intercom-core-dev-single

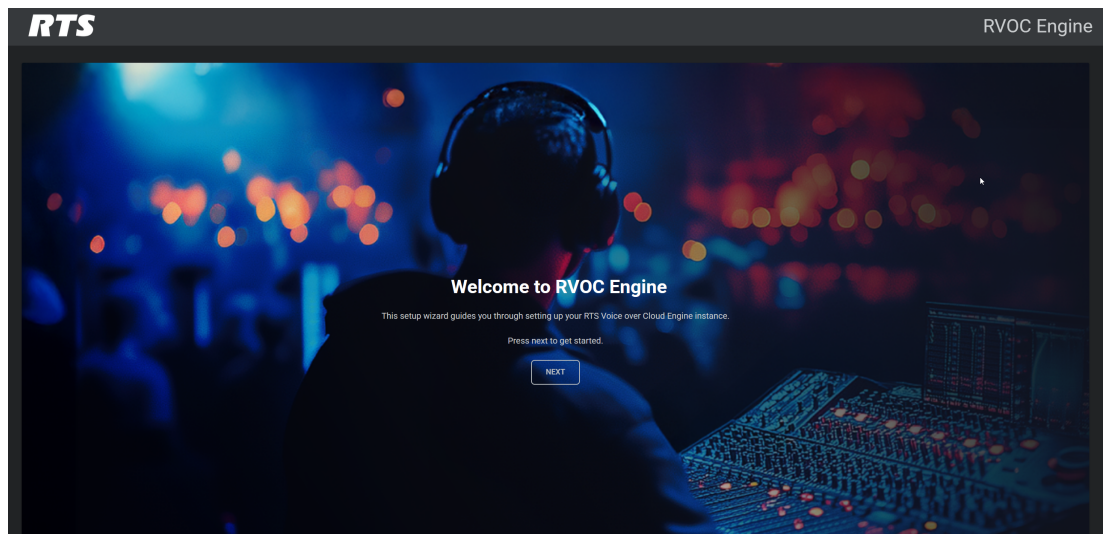
Delete Update Stack actions Create stack

Stack info Events Resources **Outputs** Parameters Template Changesets Git sync

Outputs (3)

Search outputs

| Key | Value | Description | Export name |
|------------------|---|--|-------------|
| RTSManagementAPI | https://wf02gubo2l.execute-api.us-east-1.amazonaws.com/default | Management API URL used to setup the cloud intercom (e.g. to license and setup mobile application users). | - |
| RTSONboardingURL | https://wf02gubo2l.execute-api.us-east-1.amazonaws.com/default/api/info | The URL to be used to onboard this intercom to mobile app users. | - |
| RTSPublicIP | 34.235.35.186 | Intercom IP used to access this intercom. This Intercom IP can be used to configured the intercom using RTS NEO (and IPEdit / AZEdit). This IP is also used as destination for any RVON connections. To setup DNS for the intercom (e.g. to use from RTS NEO) use this IP address in the A record. | - |



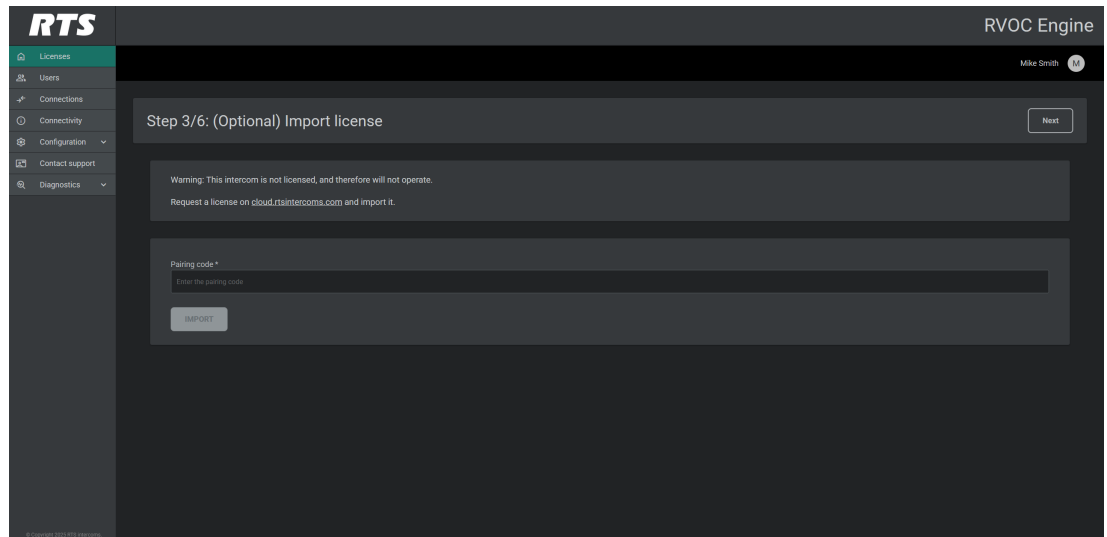
2. Click **NEXT**.
The Set up administrative profile page appears.

3. Enter your <first name>.
 4. Enter your <last name>.
 5. Enter your <email address>.
 6. Enter a <password>.
 7. Re-enter the <password>.
 8. Click **NEXT**.
- The Log-in page appears.

**Notice!**

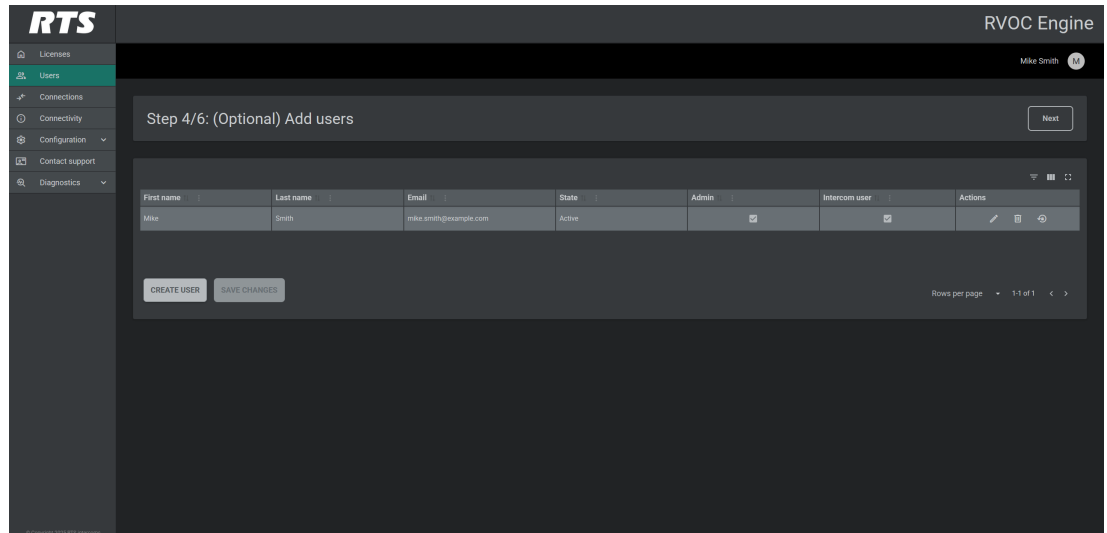
You will receive the email only if email service was configured during the stack creation in the previous steps. We will send an email to your registered address containing access information to RVOC Engine. This email serves as your login credentials for future access to the intercom.

9. Enter your <email address>.
10. Enter your <password>.
11. (Optional) Select **Keep me signed in**.
This option allows the system to remember your login information.
12. Click **NEXT**.
The Import license page appears. You may skip this step for now and complete it later.



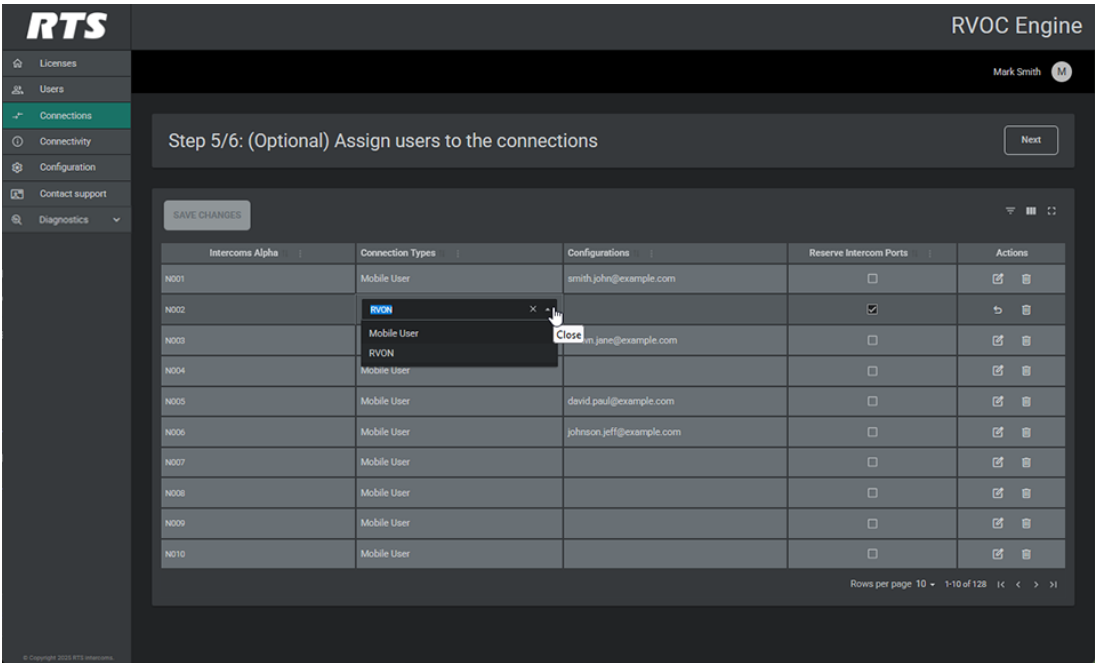
13. Click **NEXT**.

The Add users screen appears. You may skip this step for now and complete it later.



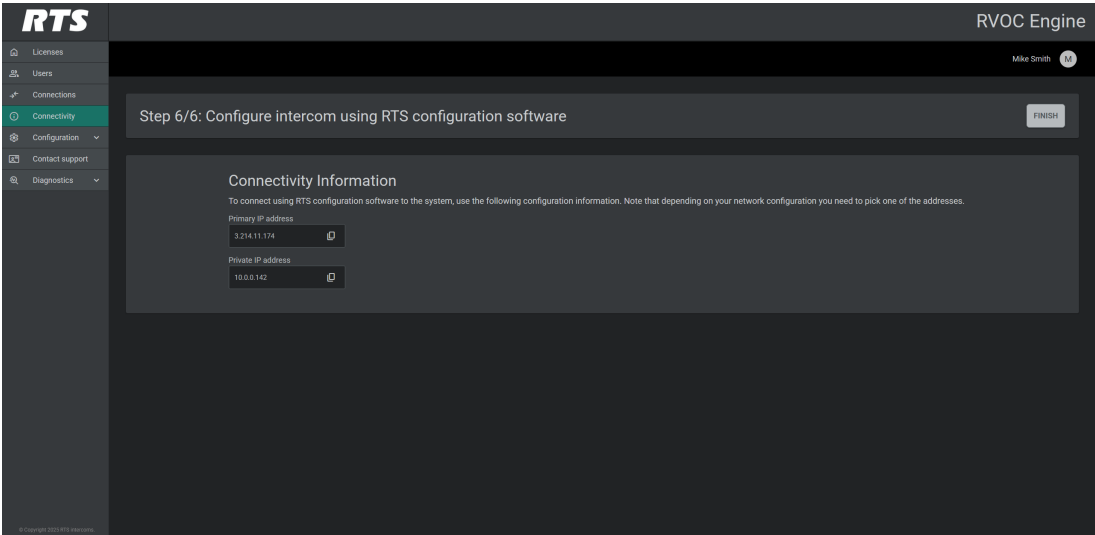
14. Click **NEXT**.

The Assign users to the connections screen appears. You may skip this step for now and complete it later.



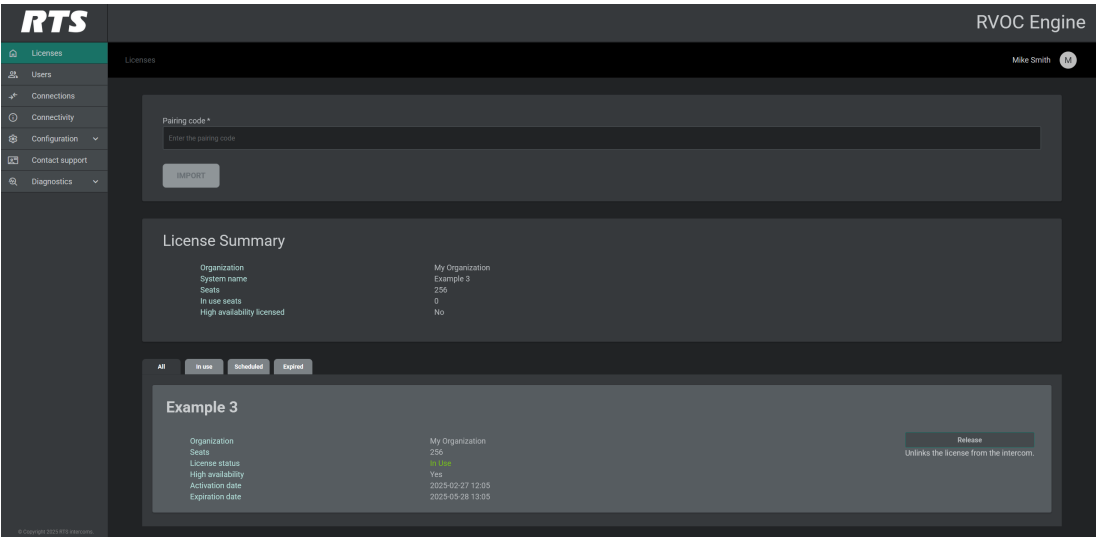
15. Click **NEXT**.

The Configure intercom using RTS configuration software screen appears.



16. Click **FINISH**.

RVOC Engine is ready.



4 Security considerations

Security on AWS is a shared responsibility between the AWS account holder and AWS.

AWS is responsible for the security of the cloud. This includes protecting the infrastructure that runs AWS services. This infrastructure is composed of the hardware, software, networking, and facilities that run AWS services.

The AWS account holder is responsible for security in the cloud. This includes everything the customer puts in the cloud. Customer responsibilities include managing operating systems, network and firewall configuration, client-side and server-side data encryption, and customer data.

Essentially, AWS secures the underlying infrastructure, and the account holder secures what they build and run on top of it.

4.1 AWS root account privileges

RVOC Engine does not require AWS root account privileges to run nor to deploy. Users should not use root access for any deployment or operation of RVOC Engine.

4.2 Least privilege

The resources deployed by the RVOC Engine CloudFormation are configured using least privilege principles. This means each server and or resource is protected with an IAM role or resource policy and only provides the access required.

When operating the solution we advise you to do the same.

Users that have an account through RVOC Engine can have different user profiles. The Users page allows you to create and manage users within RVOC Engine.

There are two available profiles in RVOC Engine:

- Administrator profile: only this profile can log into the intercom and create user profiles.
- Intercom User profile: this profile cannot access the RVOC Engine, but can user RVOC Edge.

4.3 Security groups

The CloudFormation template contains the following security groups:

| Name | Purpose |
|------------|--|
| sgintercom | <p>Associated with the main EC2 intercom running the intercom matrix and audio mixer.</p> <p>Contains access for:</p> <ul style="list-style-type: none"> – IPEdit – RVON (TSMU, Audio, Offer, Keypanel) – AZedit – RUDP <p>A single IP allow CIDR range can be configured through the cloudformation template.</p> <ul style="list-style-type: none"> – Internal traffic from the load balancers to the intercom matrix |

| Name | Purpose | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|--|-------------------------|---|--------|-------------|-----|-------------|------------------------|--|-----|-------------|-------------------------|---|-----|-------------|------------------------|--|-----|-------------|------------------------|---|-----|------|-------------------------|---|-----|-------|-----------|--------|-----|-------|-----------|---------|-----|------|-----------|------------|-----|------|-----------|--------|-----|------|-----------|---------|-----|------|-----------|------------|-----|------|-----------|------------|-----|------|-----------|-----------|
| | <table><tr><th>Protocol</th><th>Port range</th><th>Source</th><th>Description</th></tr><tr><td>TCP</td><td>8100</td><td>sg-Od687286a28984ce...</td><td>Allow audio plane traffic from internal NLB</td></tr><tr><td>TCP</td><td>8100</td><td>sg-Off82b24e66696322...</td><td>Allow audio plane traffic from intercom NLB</td></tr><tr><td>TCP</td><td>8001</td><td>sg-Od687286a28984ce...</td><td>Allow control plane traffic from internal NLB</td></tr><tr><td>TCP</td><td>8000</td><td>sg-Od687286a28984ce...</td><td>Allow control plane traffic from internal NLB</td></tr><tr><td>TCP</td><td>8000</td><td>sg-Off82b24e66696322...</td><td>Allow control plane traffic from intercom NLB</td></tr><tr><td>UDP</td><td>27415</td><td>0.0.0.0/0</td><td>RUDP</td></tr><tr><td>UDP</td><td>27410</td><td>0.0.0.0/0</td><td>AZedit</td></tr><tr><td>TCP</td><td>2100</td><td>0.0.0.0/0</td><td>IPedit</td></tr><tr><td>UDP</td><td>2100</td><td>0.0.0.0/0</td><td>IPedit</td></tr><tr><td>TCP</td><td>2080</td><td>0.0.0.0/0</td><td>RVON KP</td></tr><tr><td>UDP</td><td>2079</td><td>0.0.0.0/0</td><td>RVON Offer</td></tr><tr><td>UDP</td><td>2077</td><td>0.0.0.0/0</td><td>RVON Audio</td></tr><tr><td>UDP</td><td>2076</td><td>0.0.0.0/0</td><td>RVON TSMU</td></tr></table> | Protocol | Port range | Source | Description | TCP | 8100 | sg-Od687286a28984ce... | Allow audio plane traffic from internal NLB | TCP | 8100 | sg-Off82b24e66696322... | Allow audio plane traffic from intercom NLB | TCP | 8001 | sg-Od687286a28984ce... | Allow control plane traffic from internal NLB | TCP | 8000 | sg-Od687286a28984ce... | Allow control plane traffic from internal NLB | TCP | 8000 | sg-Off82b24e66696322... | Allow control plane traffic from intercom NLB | UDP | 27415 | 0.0.0.0/0 | RUDP | UDP | 27410 | 0.0.0.0/0 | AZedit | TCP | 2100 | 0.0.0.0/0 | IPedit | UDP | 2100 | 0.0.0.0/0 | IPedit | TCP | 2080 | 0.0.0.0/0 | RVON KP | UDP | 2079 | 0.0.0.0/0 | RVON Offer | UDP | 2077 | 0.0.0.0/0 | RVON Audio | UDP | 2076 | 0.0.0.0/0 | RVON TSMU |
| Protocol | Port range | Source | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8100 | sg-Od687286a28984ce... | Allow audio plane traffic from internal NLB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8100 | sg-Off82b24e66696322... | Allow audio plane traffic from intercom NLB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8001 | sg-Od687286a28984ce... | Allow control plane traffic from internal NLB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8000 | sg-Od687286a28984ce... | Allow control plane traffic from internal NLB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8000 | sg-Off82b24e66696322... | Allow control plane traffic from intercom NLB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 27415 | 0.0.0.0/0 | RUDP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 27410 | 0.0.0.0/0 | AZedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 2100 | 0.0.0.0/0 | IPedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2100 | 0.0.0.0/0 | IPedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 2080 | 0.0.0.0/0 | RVON KP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2079 | 0.0.0.0/0 | RVON Offer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2077 | 0.0.0.0/0 | RVON Audio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2076 | 0.0.0.0/0 | RVON TSMU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| sgnlbinternal | <p>Associated with the network load balancer that distributes the traffic from the API Gateway.</p> <table><tr><th>Protocol</th><th>Port range</th><th>Source</th><th>Description</th></tr><tr><td>TCP</td><td>8100</td><td>0.0.0.0/0</td><td>Allow inbound audio plane traffic (needs allow all because of API Gateway)</td></tr><tr><td>TCP</td><td>8001</td><td>0.0.0.0/0</td><td>Allow inbound control plane management traffic (needs allow all because of API Gateway)</td></tr><tr><td>TCP</td><td>8000</td><td>0.0.0.0/0</td><td>Allow inbound control plane traffic (needs allow all because of API Gateway)</td></tr></table> | Protocol | Port range | Source | Description | TCP | 8100 | 0.0.0.0/0 | Allow inbound audio plane traffic (needs allow all because of API Gateway) | TCP | 8001 | 0.0.0.0/0 | Allow inbound control plane management traffic (needs allow all because of API Gateway) | TCP | 8000 | 0.0.0.0/0 | Allow inbound control plane traffic (needs allow all because of API Gateway) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protocol | Port range | Source | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8100 | 0.0.0.0/0 | Allow inbound audio plane traffic (needs allow all because of API Gateway) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8001 | 0.0.0.0/0 | Allow inbound control plane management traffic (needs allow all because of API Gateway) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 8000 | 0.0.0.0/0 | Allow inbound control plane traffic (needs allow all because of API Gateway) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| sgturn | <p>Associated with the Turn server that allows the Stun and Turn traffic only from the public internet.</p> <table><tr><th>Protocol</th><th>Port range</th><th>Source</th><th>Description</th></tr><tr><td>TCP</td><td>3478 - 3479</td><td>::/0</td><td>Allow public traffic for STUN / TURN traffic (Allow all mobile traffic)</td></tr><tr><td>TCP</td><td>3478 - 3479</td><td>0.0.0.0/0</td><td>Allow public traffic for STUN / TURN traffic (Allow all mobile traffic)</td></tr><tr><td>UDP</td><td>3478 - 3479</td><td>::/0</td><td>Allow public traffic for STUN / TURN traffic (Allow all mobile traffic)</td></tr><tr><td>UDP</td><td>3478 - 3479</td><td>0.0.0.0/0</td><td>Allow public traffic for STUN / TURN traffic (Allow all mobile traffic)</td></tr></table> | Protocol | Port range | Source | Description | TCP | 3478 - 3479 | ::/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | TCP | 3478 - 3479 | 0.0.0.0/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | UDP | 3478 - 3479 | ::/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | UDP | 3478 - 3479 | 0.0.0.0/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protocol | Port range | Source | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 3478 - 3479 | ::/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 3478 - 3479 | 0.0.0.0/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 3478 - 3479 | ::/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 3478 - 3479 | 0.0.0.0/0 | Allow public traffic for STUN / TURN traffic (Allow all mobile traffic) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| sgnlbintercom | <p>Associated with the Network Loadbalancers which allows all intercom related traffic to pass to the intercom matric</p> <p>Contains access for:</p> <ul style="list-style-type: none">– IPedit– RVON (TSMU, Audio, Offer, Keypanel)– AZedit– RUDP. <p>A single IP allow CIDR range can be configured through the cloudformation template.</p> <table><tr><th>Protocol</th><th>Port range</th><th>Source</th><th>Description</th></tr><tr><td>TCP</td><td>2100</td><td>0.0.0.0/0</td><td>IPedit</td></tr><tr><td>UDP</td><td>2100</td><td>0.0.0.0/0</td><td>IPedit</td></tr><tr><td>UDP</td><td>2076</td><td>0.0.0.0/0</td><td>RVON TSMU</td></tr><tr><td>UDP</td><td>27415</td><td>0.0.0.0/0</td><td>RUDP</td></tr><tr><td>UDP</td><td>2079</td><td>0.0.0.0/0</td><td>RVON Offer</td></tr><tr><td>UDP</td><td>27410</td><td>0.0.0.0/0</td><td>AZedit</td></tr><tr><td>TCP</td><td>2080</td><td>0.0.0.0/0</td><td>RVON KP</td></tr><tr><td>UDP</td><td>2077</td><td>0.0.0.0/0</td><td>RVON Audio</td></tr></table> | Protocol | Port range | Source | Description | TCP | 2100 | 0.0.0.0/0 | IPedit | UDP | 2100 | 0.0.0.0/0 | IPedit | UDP | 2076 | 0.0.0.0/0 | RVON TSMU | UDP | 27415 | 0.0.0.0/0 | RUDP | UDP | 2079 | 0.0.0.0/0 | RVON Offer | UDP | 27410 | 0.0.0.0/0 | AZedit | TCP | 2080 | 0.0.0.0/0 | RVON KP | UDP | 2077 | 0.0.0.0/0 | RVON Audio | | | | | | | | | | | | | | | | | | | | |
| Protocol | Port range | Source | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 2100 | 0.0.0.0/0 | IPedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2100 | 0.0.0.0/0 | IPedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2076 | 0.0.0.0/0 | RVON TSMU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 27415 | 0.0.0.0/0 | RUDP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2079 | 0.0.0.0/0 | RVON Offer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 27410 | 0.0.0.0/0 | AZedit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TCP | 2080 | 0.0.0.0/0 | RVON KP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UDP | 2077 | 0.0.0.0/0 | RVON Audio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

4.4 Data storage and encryption

All sensitive data is stored within the AWS account of the deployment. This can be found in the following components:

- AWS Cognito; this stores the email address, first name, last name and password of the users. Please refer to the AWS Cognito documentation for their current encryption strategy. AWS Cognito is accessed through the HTTPS using IAM roles.
- AWS S3; this stores the current intercom configuration as well the username and password for the application connectivity using service side encryption. The S3 bucket is accessed through HTTPS with IAM roles.

4.5 Security consideration

All software fully supports IMDSv2. IMDSv1 is not required.

When deploying the RVOC Engine you are exposing following resources to the public internet:

- AWS Cognito
- AWS API Gateway
- AWS NLB
- (Optionally) AWS Global Accelerator
- (Optionally) Amazon EC2

You are not required to make any IAM Role / IAM policy manually.

You are not required to define any secrets yourself. Upon deployment RVOC Engine does generate deployment specific secrets which are stored in AWS Secret Manager and is used for security of the Turn server

5 Costs

5.1 AWS resource costs

AWS resource cost to consider are:

- EC2
- S3
- Network Loadbalancer
- API Gateway
- Elastic IP
- Network cost

The recommended instance type for RVOC Engine is the C8G (Compute optimized Graviton3), after extensive testing these instances are concluded to have the best price performance point.

5.2 TCO calculation tool

The RVOC Elevate application provides a Total Cost of Ownership calculation tool which can be used to calculate the AWS infrastructure cost to run your RVOC Engine:

| Input | Description |
|-------------------|---|
| Mobile Devices | The number of RVOC Edge applications you want to connect in parallel |
| RVON | The number of Trunk lines and Hardware Key Panels you want to connect in parallel |
| Tie lines | The number of tie lines (for hybrid systems) |
| High Availability | Whether the system is deployed in high availability mode or not |
| AWS Region | The AWS region you want to use for your deployment |

The tools provides a breakdown for the following categories:

- Compute
The required compute for the provided channel counts
- Bandwidth
The cost of the bandwidth under normal use / with voice activation enabled
- Connectivity
The cost of the provisioned connectivity
- Observability
Cost of the observability services

5.3 Example TCO calculation

An example calculation of a system using:

- 16 Mobile Device
- 16 RVON Key Panels
- 32 Tie lines
- No high availability
- Deployed in us-east-1

Note that the TCO (and the deployment template) automatically select the required instance size based on the number of configured audio channels.

Compute:

| Item | Required amount | Instance types | Price per unit | Single system |
|----------------------|-----------------|----------------|------------------|---------------|
| Turn Server instance | 0.06 CPU | c8g.medium | \$ 0.03988 / Hrs | \$ 28.71 |
| Single instance | 2.88 CPU | c8g.xlarge | \$ 0.15952 / Hrs | \$ 114.85 |

Bandwidth

| Item | Required amount | Price per unit | Single system |
|--------------------|-----------------|----------------|---------------|
| Control Plane data | 0.54 GB | \$ 0.09 / GB | \$ 0.05 |
| Tie lines data | 232.24 GB | \$ 0.09 / GB | \$ 20.9 |
| Api Gateway data | 0.54 GB | \$ 0.09 / GB | \$ 0.05 |
| RVON data | 116.12 GB | \$ 0.09 / GB | \$ 10.45 |
| WebRTC data | 124.42 GB | \$ 0.09 / GB | \$ 11.2 |

Connectivity:

| Item | Required amount | Price per unit | Single system |
|-----------------------------------|----------------------|------------------------|---------------|
| ApiGateway | 691200 minutes | \$ 2.5e-7 / minutes | \$ 0.17 |
| Messages | 538080 Messages | \$ 0.000001 / Messages | \$ 0.54 |
| Private network loadbalancer | 720 hours | \$ 0.0225 / Hrs | \$ 16.2 |
| Private network loadbalancer nclu | 720 hours | \$ 0.006 / LCU-Hrs | \$ 4.32 |
| Public network loadbalancer | 720 hours | \$ 0.0225 / Hrs | \$ 16.2 |
| Public network loadbalancer nclu | 720 hours | \$ 0.006 / LCU-Hrs | \$ 4.32 |
| Public ips | 2160 hours / 3 Items | \$ 0.005 / Hrs | \$ 10.8 |
| VPC endpoint | 2160 hours | \$ 0.01 / Hrs | \$ 21.6 |
| VPC endpoint data processing | 0.53808 GB | \$ 0.01 / GB | \$ 0.01 |

Observability:

| Item | Required amount | Price per unit | Single system |
|----------------------|-----------------|----------------------|---------------|
| CloudWatch | 0.96 GB | \$ 0.5 / GB | \$ 0.48 |
| Metrics | 100 Metrics | \$ 0.3 / Metrics | \$ 30 |
| Metrics API requests | 864000 Metrics | \$ 0.00001 / Metrics | \$ 8.64 |

Which brings a total cost of \$299.50 per month.

5.4

RTS licensing

You must pay the licensing cost for the RVOC Engine. Please contact your RTS intercoms reseller to get a quote.

The following licensing plans are available:

Daily

| # of Seats | High Availability | License |
|------------|-------------------|-------------------|
| 10 | | RVOC IaaS-DY-S-ST |
| 10 | X | RVOC IaaS-DY-S-HA |
| 25 | | RVOC IaaS-DY-M-ST |
| 25 | X | RVOC IaaS-DY-M-HA |
| 75 | | RVOC IaaS-DY-L-ST |
| 75 | X | RVOC IaaS-DY-L-HA |

Weekly

| # of Seats | High Availability | License |
|------------|-------------------|-------------------|
| 10 | | RVOC IaaS-WK-S-ST |
| 10 | X | RVOC IaaS-WK-S-HA |
| 25 | | RVOC IaaS-WK-M-ST |
| 25 | X | RVOC IaaS-WK-M-HA |
| 75 | | RVOC IaaS-WK-L-ST |
| 75 | X | RVOC IaaS-WK-L-HA |

Monthly

| # of Seats | High Availability | License |
|------------|-------------------|-------------------|
| 10 | | RVOC IaaS-MO-S-ST |
| 10 | X | RVOC IaaS-MO-S-HA |

| # of Seats | High Availability | License |
|------------|-------------------|-------------------|
| 25 | | RVOC IaaS-MO-M-ST |
| 25 | X | RVOC IaaS-MO-M-HA |
| 75 | | RVOC IaaS-MO-L-ST |
| 75 | X | RVOC IaaS-MO-L-HA |

Yearly

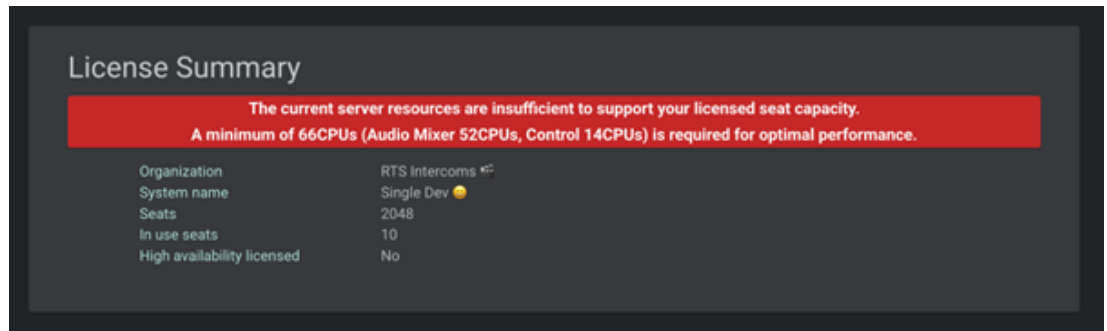
| # of Seats | High Availability | License |
|------------|-------------------|-------------------|
| 10 | | RVOC IaaS-YR-S-ST |
| 10 | X | RVOC IaaS-YR-S-HA |
| 25 | | RVOC IaaS-YR-M-ST |
| 25 | X | RVOC IaaS-YR-M-HA |
| 75 | | RVOC IaaS-YR-L-ST |
| 75 | X | RVOC IaaS-YR-L-HA |

6 Testing and troubleshooting

6.1 Testing

Before taking an intercom system in production; you should verify whether:

- The system is provisioned with enough resources to full-fill the required needs in terms of seats. Note that the intercom will give you a warning when more seats are licensed than the CPU capacity available can handle.



- The end-2-end latency is fit for the purpose of the installation. Other than with full on-premise systems, part of the network might not be under control of the operator. Physical distance and network congestion might lead to network latency.
- Perform a trial run of all essential communication required for intended use.

6.2 Troubleshooting

Options

The intercom provides different options for troubleshooting:

- The intercom emits metrics to cloud watch about the health of the systems and additional system metrics which can define the health of the system.
The average CPU usage should be below 80%. The intercom should signal a continuous health signal to CloudWatch.
- IPedit allows you to monitor signal paths between RVOC Engine and individual endpoints. It allows you to inspect both latency and jitter. Jitter is typically required to be less than the packet size (e.g. 10 ms in case RVOC Edge, 10/20 or 30 ms in case of RVON).
- RVOC Engine allows you to contact support directly from the installation. When contacting support, you could send the logs files and system diagnostics to support for further analyses.

Troubleshooting

| Problem | Solution |
|--|---|
| I installed by RVOC engine, but I get an internal server error when using the RTSMangementAPI url. | <p>There can be multiple root causes to this issue:</p> <ul style="list-style-type: none"> – Validate whether the S3 bucket referenced in the cloudformation setup contains the intercom installer (RVOCEngine-Intercom-arm64-latest.deb or RVOCEngine-Intercom-ha-arm64-latest.deb) and its associated signature for validation (RVOCEngine-Intercom-arm64-latest.deb.sig or RVOCEngine-Intercom-arm64-ha-latest.deb.sig) |

| Problem | Solution |
|---|--|
| | <ul style="list-style-type: none"> – The intercom must have connectivity to the internet. Validate whether the private subnet has a NAT gateway attached or any other path to the internet. When DNS filter is used, ensure the default ubuntu repositories are accessible as is SNAP. Inspect the instance log for any installations issues, the installation must complete without errors. |
| My cloudformation template installation fails | <p>The first error occurred when deploying the cloud formation template is most likely the root cause, known issues:</p> <ul style="list-style-type: none"> – Subnet does not contain any IPv6 CIDR block range - You have enabled IPv6 in the intercom deployment without have IPv6 ranges associated with the VPC. Add IPv6 ranges (and settings) to your VPC deployment OR re-deploy the intercom with IPv6 disabled. – The maximum number of addresses has been reached - There are not sufficient public IPv4 addresses available in the AWS account for the current region. To protect the global AWS infrastructure AWS by default has a limit of 5 public IP addresses per region / account. You can request a quota increase. Note that the quota increase itself does not cost money, only when you use the additional addresses you will be billed for the additional allowance. – rts-intercom-date-* - already exists. The stack creates a S3 bucket to store the intercom configuration. The S3 bucket already exists, either remove the S3 bucket manually or change the stage parameter in the deployment. |
| The instance type is not available | <p>The intercom deployment uses by default Graviton3 instance types, not all AWS regions / availability zones have this instance type available.</p> <p>Verify which Graviton instance (e.g. c6g, c7g) is available on the current region / availability zone and use this (please contact RTS support for any required information for size selection).</p> |

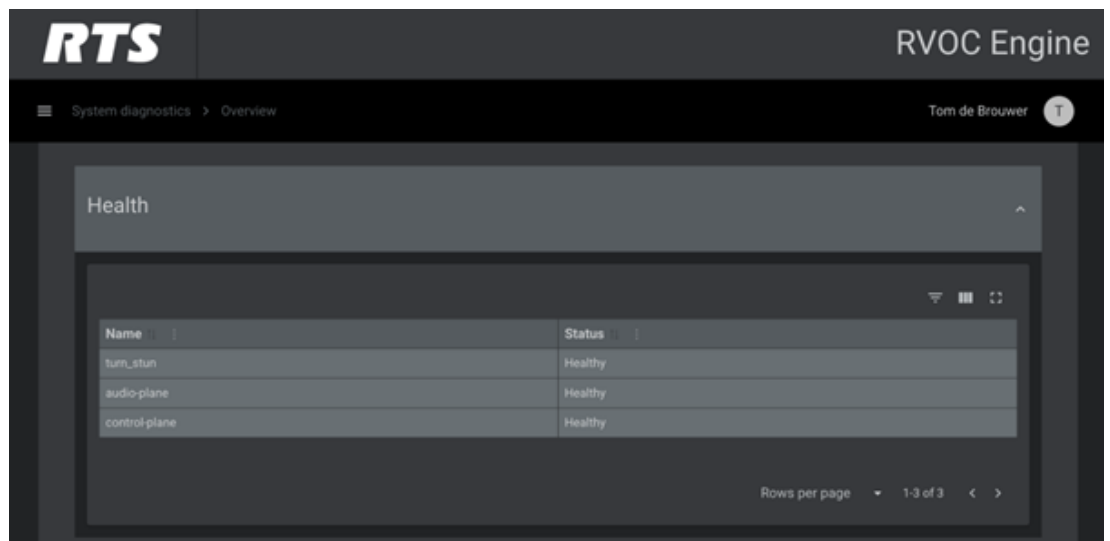
| Problem | Solution |
|---------|--|
| | AWS might have the required instance type available in any other availability zone within the same region. You can select a different availability zone with the network selection of the Cloudformation template. |

6.3 Health check

The RVOC engine emits every 5 minutes a health check to the AWS Cloudformation service. Use the health check to set up automated alarms on the health of the system.

The health check includes the critical components of the infrastructure such as the Intercom Matrix, Audio Mixer and Stun and Turn infrastructure.

The current status of the health check can also be found on the diagnostics pages of the intercom



The Network Loadbalancers are set up to continuously monitor the health of the instances and route traffic to an available instance.

6.4 Backup and recovery

All information stored on the EC2 server is volatile, all configuration data that is required is stored on a private S3 bucket and is high-available by design. The S3 bucket is configured with object versioning to full-fill any rollbacks when required.

All components are deployed within AutoScaling groups. Whenever a hardware failure is detected or eminent, the instance can be terminated which will automatically create (and start) a new instance.

The configuration is re-loaded automatically.

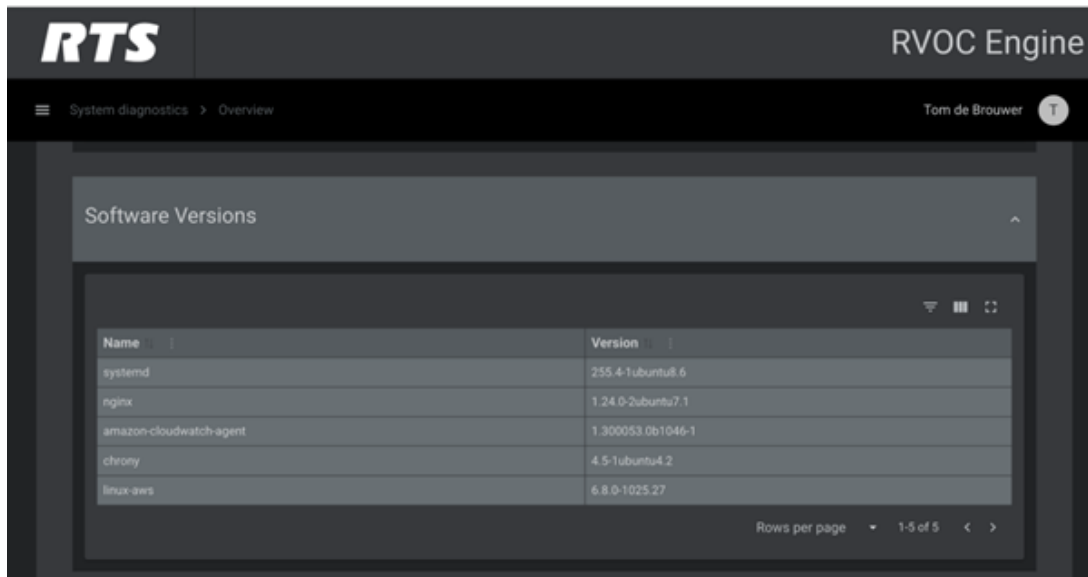
7 Routine maintenance

Application updates are available occasionally. It is advisable to plan an hour of downtime per month to install the RVOC engine updates and perform incremental testing.

Furthermore, it is advisable to update to the operating system at least once a week.

The system only uses short-lived credentials to access any other systems, no manual rotation of keys is required.

The current version of the critical components are found in the diagnostics section of the RVOC Engine:



The screenshot shows the 'System diagnostics > Overview' page of the RTS RVOC Engine. The page title is 'Software Versions'. It contains a table with two columns: 'Name' and 'Version'. The table lists the following components and their versions:

| Name | Version |
|-------------------------|-------------------|
| systemd | 255.4-1ubuntu8.6 |
| nginx | 1.24.0-2ubuntu7.1 |
| amazon-cloudwatch-agent | 1.300053.0b1046-1 |
| chrony | 4.5-1ubuntu4.2 |
| linux-gws | 6.8.0-1025.27 |

At the bottom right of the table, it says 'Rows per page 1-5 of 5'.

7.1 Emergency maintenance

In case of 0-day exploits or other high security risk, you will receive security bulletins through the users known in RVOC Elevate.

7.2 Update the software running on the intercom

Before you start:

Override the debian installer and the signature file belonging to the installer on the S3 bucket with the desired version.

There are two options in updating the software:

Option 1 (traditional): 10 minutes downtime

- Terminate the instance, the auto-scaling group restarts it, and the instance automatically installs the latest version from the S3 bucket.

Option 2 (advanced): 1 minute downtime



Notice!

You must replace "the asset bucket" with the name of the bucket that contains the installer files.

- Connect to the terminal of the instance (for example by using the Session Manager) and then run the following script:

```
#!/bin/bash
# Exit immediately if a command exits with a non-zero status
set -e

# Enable better error reporting
trap 'echo "Error occurred at line $LINENO. Command: $BASH_COMMAND"' ERR

# Define log function
log() {
local timestamp=$(date '+%Y-%m-%d %H:%M:%S')
echo "[$timestamp] $1"
}

aws s3 cp s3://<asset bucket>/RVOCEngine-Intercom-arm64-latest.deb .
aws s3 cp s3://<asset bucket>/RVOCEngine-Intercom-arm64-latest.deb.sig .

if gpg --verify RVOCEngine-Intercom-arm64-latest.deb.sig RVOCEngine-
Intercom-arm64-latest.deb; then
log "Signature verification successful, proceeding with installation"

apt-get install ./RVOCEngine-Intercom-arm64-latest.deb

log "Done!"
else
log "Signature verification failed, aborting installation"
exit 1
fi
```

7.3 Support

You can receive support through the contact support page in either the RVOC Engine (in case the installation did succeed) or through RVOC Elevate (in case of any installation issues).

Furthermore, please contact your distributor or RTS Intercoms directly for any advanced requirements around SLAs and support.

8 License management

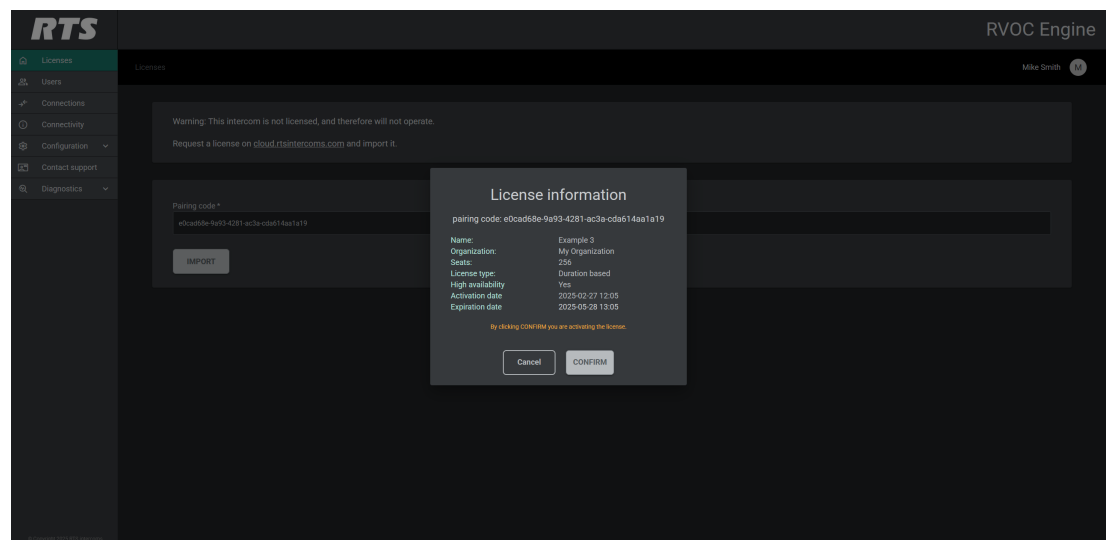
8.1 Pair a license

Pairing the license allows RVOC Engine to start. You can pair an unlimited number of licenses to the system.

Pair a license

1. Open RVOC Engine.
2. Navigate to the **Licenses** page.
3. Enter the **<pairing code>** you receive from the RVOC Elevate administrator.
4. Click **IMPORT**.

The License information screen appears.



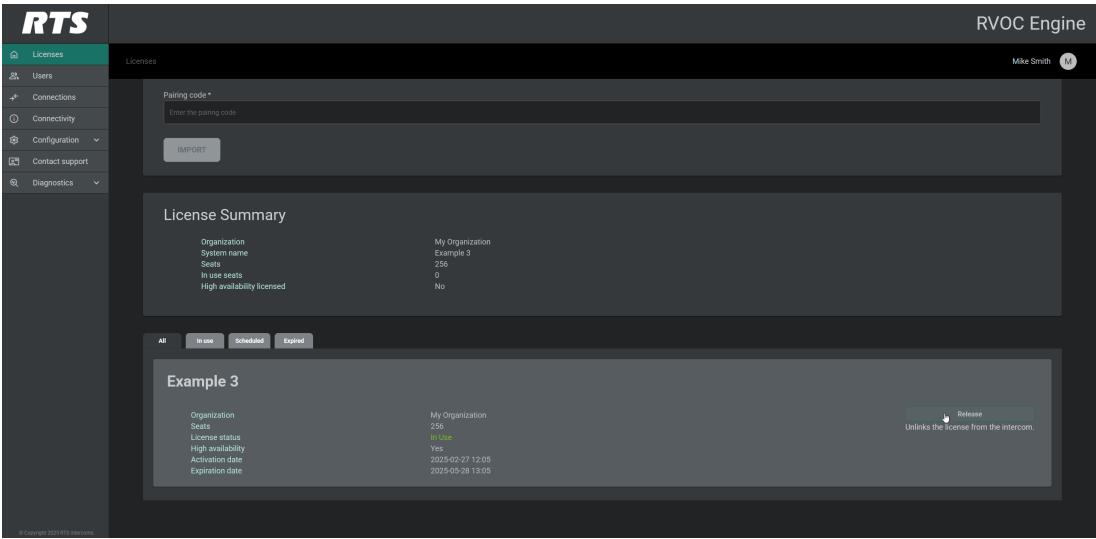
5. Click **Confirm**.
A green success message appears.

8.2 Release a license

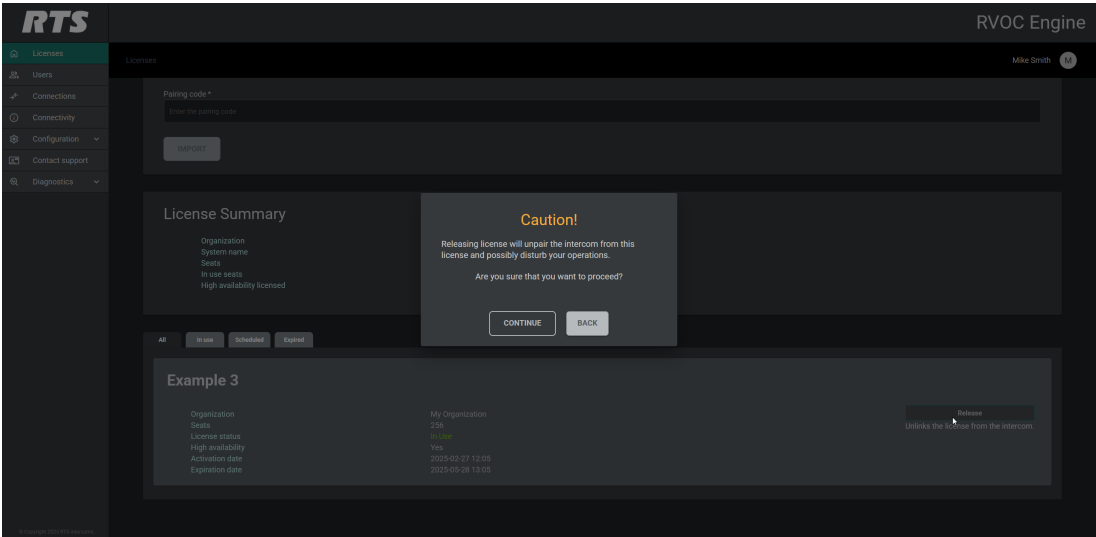
You may need to unpair a license from a cloud application for several reasons. When licenses are up for renewal, unpairing helps manage and update licensing arrangements. If you encounter authentication or permission problems, unpairing and reassigning the license can often resolve these access issues. Additionally, you might unpair licenses that are not being used so they can be reallocated where needed, ensuring efficient use of your resources.

Release a license

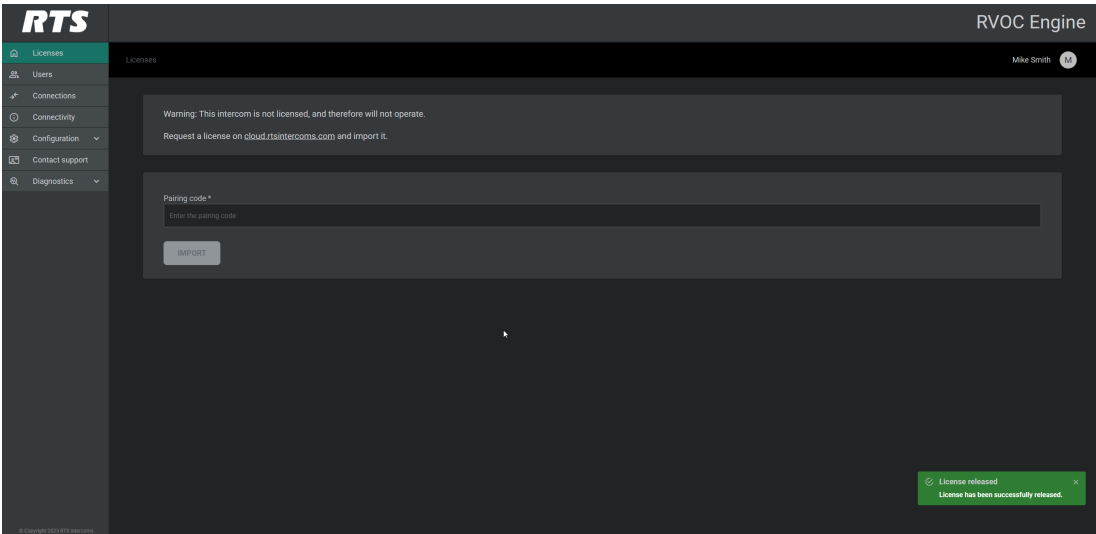
1. Navigate to the **Licenses** page.
2. Find the **license** you want to release.



3. Click **Release**.
A confirmation message appears.



4. Click **CONTINUE**.
A success message appears.



9

CloudFormation fields

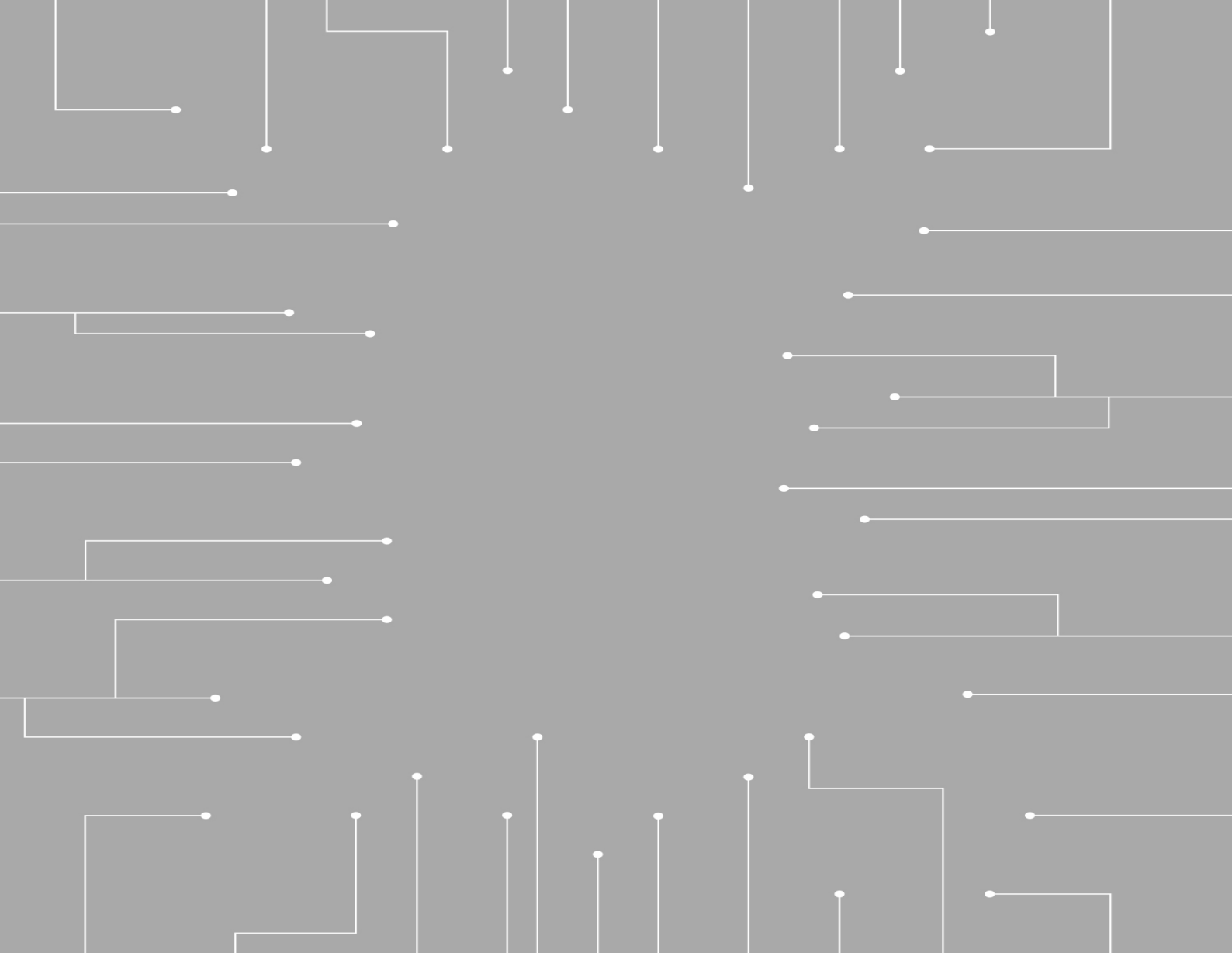
| Template Field | Description | Where to get it | Example |
|-----------------------------------|---|---|-------------------------------|
| General Settings | | | |
| Stage | Stage identifier of the deployment, this will be added as a postfix to all resources created by the stack. | Max 10 characters Unique identifier made by the user. If you create 2 intercoms this is needed. Must have at least one character (mandatory) | prod |
| AssetBucketKey | The S3 bucket name (and optionally the path) where the intercom installers are stored. Note that the bucket must provide access to the instances. | Should contain the intercom installers. Needs to be created in the Amazon S3 service before creating the intercom. | s3://dev-asset-bucket- rts |
| Sizing Configuration | | | |
| MaxAudioConnections | Amount of audio connections. (Warning: This should be the MAXIMUM size as resizing will cause interruptions) | This is the number of RVON KPs, mobile apps and IFL connections, combined. | 64/128/256/512/1024/ 2048 |
| OverrideInstanceType | Override the instance type. By default, the instance type is determined by the number of audio connections. | | c86.xlarge |
| Network Configuration | | | |
| IntercomTerminationInPublicSubnet | Determines whether the intercom termination points (e.g. for configuration software and keypanel connections) should be deployed in the public subnet | | |
| VPCID | VPC ID (Must contain the passed subnets) | From AWS VPC service. | vpc-09d2bbca22a1e05e2 |

| Template Field | Description | Where to get it | Example |
|--------------------------|--|---|---|
| PublicSubnetID | Public Subnet ID (must be in the same AZ as the Private Subnet) | From VPC service in AWS | subnet-0a14a8f11e4a609ad |
| PrivateSubnetID | Private Subnet ID (must be in the same AZ as the Public Subnet) | From VPC service in AWS | subnet-0cb3fa4075e8e19cf |
| AvailabilityZone (AZ) | Availability Zone (must be the AZ of the passed Subnets) | Select the area where the desired subnet is available. Must choose two for redundant system. (availability a and b) | us-east-1a |
| EnableIPv6 | Enabled IPv6 on the application (e.g. turn server). Should only be set to true when the public subnets have IPv6 CIDR ranges associated with them. | Choose true or false Only choose true if IPv6 is supported in VPC | true/false |
| EnableGlobalAccelerator | Enable the AWS global accelerator. Note: AWS Global Accelerator will help in certain redundancy use cases as well in optimizing the latency in a highly distributed system. | This Determine based on system design Ensures high redundancy | true/false |
| IngressCIDRBlock | A CIDR range used to restrict ingress traffic. | | 54.13.0.0/16 |
| DNS Configuration | | | |
| IntercomDomainName | The domain name of the intercom. If passed (together with the hosted zone id) DNS will be configure in Route53. When not passed you could setup DNS yourself as per user manual. | From your DNS setup | prodintercom.intercoms.cloud.rtsintercoms.com |
| IntercomHostedZoneID | The hosted zone id of the intercom. If passed (together with the domain) DNS will be | Get from route 53 service | Z0449071400S00GW EKADS |

| Template Field | Description | Where to get it | Example |
|-----------------------------------|--|---------------------------------|---|
| | configure in Route53. When not passed you could setup DNS yourself as per user manual." | | |
| ManagementAPIDomainName | Management API domain name. If passed (together with the certificate) the API Gateway will be deployed on a custom domain. | From your DNS setup | prod.intercoms.cloud.rtsintercoms.com |
| ManagementAPIDomainCertificateARN | Management API domain SSL certificate ARN. If passed (together with the domain) the API Gateway will be deployed on a custom domain. | AWS certificate manager service | arn:aws:acm:us-east-1:851275182736:certificate/b1a88034-554b-45be-b506-e5b4b24c4c75 |
| ManagementAPIHostedZoneID | The hosted zone id of the management API. If passed (together with the domain and certificate) the API Gateway will be deployed on a custom domain. When not passed you could setup DNS yourself as per user manual. | From route 53 | Z04490714O0S00GW EKADS |
| Email Configuration | | | |
| EmailFromAddress | The email address that will be used as the 'From' address for emails sent by the system. Note that it is expected SES has been setup to allow emails to be sent from this address and SES is in production mode | | reply@cloud.rtsintercoms.com |

| Template Field | Description | Where to get it | Example |
|--------------------------|--|---|---------------------------------|
| EmailReplyToAddress | (Optional) The email address that will be used as the 'Reply To' address for emails sent by the system. | | Reply-to@cloud.rtsintercoms.com |
| EmailProvider | Select the email provider. Available options are None, AWS-SES, and SMTP. | | |
| SMTPHostname | The hostname of the email server (required if SMTP is selected). | | |
| SMTPPort | The port of the email server (required if SMTP is selected). | | |
| SMTPUsername | The username for the email server (required if SMTP is selected, can be overridden in the AWS Secret Manager). | | |
| SMTPPassword | The password for the email server (required if SMTP is selected, can be overridden in the AWS Secret Manager). | | |
| Advanced Settings | | | |
| DeployCoturn | Deploy Coturn as part of the stack. When deployed the intercom is as well configured with all properties to setup the STUN/TURN server in front of the traffic. Note that in most use cases it is required to run a STUN/TURN server to make the intercom function. | | true/false |
| DeployCoturnNetworkLayer | Determines in which network layer to deploy the TURN server. When deploying the | Align with you cloud security department. | Public |

| Template Field | Description | Where to get it | Example |
|-----------------------|--|-----------------|----------------------------|
| | turnserver in the public subnet, the turnserver is directly associated with a public IP address, when deploying the turn server in a private subnet, the turnserver is associated with a Network Load Balancer. Note that placing the TURNserver in a private subnet considerably increases the Total Cost of Ownership. | | |
| OverrideInstanceAmi | Override the instance AMI. Note that we only support Ubuntu 2024 and Ubuntu 2022. | | |
| LicenseServerHostName | The Backoffice endpoint. | | api.cloud.rtsintercoms.com |



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