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# **Resgrid Core Documentation**

**Resgrid, LLC.**

**Aug 27, 2023**



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Resgrid is a computer aided dispatch, management and logistics for first responders, disaster response, emergency management and companies.

Originally started as a hosted only solution in 2014, the Resgrid system as processed hundreds of thousands of calls, messages, statuses and staffing updates and much more. With over 4,000 departments signed up Resgrid is the only open source computer aided dispatch system able to run at scale.

Resgrid is written on the Microsoft .Net and .Net Core Frameworks utilizing Microsoft SQL Server as the primary data repository.



# CHAPTER 1

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## Features

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- **Personnel Management:** Define personnel, contact information, details, certification, roles, status and availability for all personnel
- **Unit Support:** Support for apparatuses and groups of personnel working as a single unit (i.e. a USAR team) with AVL, accountability and logging
- **Groups and Locations:** Create groups and locations and assign personnel or units underneath for management of large or disperse organizations
- **Computer Aided Dispatch:** Create CallsIncidents and dispatch personnel, units, roles or groups to respond to those incidents both manual and automatic dispatches are supported
- **Messaging:** Built in message system to allow for targeted and dynamic communications to personnel
- **Chat:** Embedded P2P, Groups, Dispatch to Unit and Command chat system to enable very quick text based communications
- **Duty Shift System:** Create both Assigned Shifts and Signup Shifts to manage a static or dynamic workforce, switch swapping and trading support with attendance validation
- **Learning Management:** Design Trainings with text based materials, attach documents or presentations or link to external videos and assign questions to validate understanding of material
- **Run Logs and Logging:** Record actions of a call, training and meetings to keep tract of actions and events, hours, personnel and units involved
- **Reporting\*\*** Generate reports for run logs, calls, training, meetings and more. Ability to use Reporting to create exports to integrate with 3rd party systems
- **Calendar System:** Create calendar entries and setup RSVP style events to keep personnel engaged and informed about activities and events
- **Inventory Management:** Track any kind of inventory both perishable (like medicine) and durable (like hand tools) equipped on apparatus, issued to personnel or stored at locations
- **Document Storage:** Upload and serve documents at a department or group level to members of your organization allowing a centralized place to serve documents from

- Notifications Service: Flexible notification system to alert of low personnel role or unit availability, staffing or status changes or any other system generated event
- Department Linking: Create powerful department links to allow for multiple independent organizations (i.e. mutual aid agreements or centralized dispatch center) to cooperate
- Mobile Apps: Apps available on Google Play and Apple App Store that can work with any standard installation. For Personnel, Units, Stations and Commanders.
- API: Included API with information about calls allow for easy extension and interaction without having to change code in the Resgrid Core codebase



## CHAPTER 2

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### Getting started

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- *Installation* – Install and run the Resgrid system
- *Docker* – Install and run the Resgrid system with Docker
- *Development* – Start developing with Resgrid
- *Contributing* – Contribution guidelines and information
- *System* – Overview of the Resgrid system and features
- *Setup* – Walkthrough on setting up your department
- *Configuration* – All configuration options for your department
- *Apps* – Documentation for our external applications



## CHAPTER 3

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### Links

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- [Resgrid Homepage and Hosted Solution](#)
- [Documentation](#)
- [Source code](#)



### 4.1 Overview

#### 4.1.1 Installation Types

Resgrid is open source software, so you can download the Resgrid source from [GitHub](#). We also provide a hosted version of Resgrid with a free plan and paid plan levels [Resgrid](#).

#### 4.1.2 Support

You can report a bug or request a feature for Resgrid by opening up an issue on Github [GitHub Issues](#). If your a customer of the Hosted Version of Resgrid, please use the support system within the application there. If your having issues with your OnPrem installation of Resgrid you can engage Resgrid for professional support services.

#### 4.1.3 Professional Support

We offer professional support for Resgrid, as well as remote consulting and engineering.

You can contact us at [shawn@resgrid.com](mailto:shawn@resgrid.com) to learn more, or visit us at <https://resgrid.com>.

### 4.2 Installation

In this section we will go over all the steps needed to get Resgrid running on your own environment.

#### 4.2.1 Requirements Notice

It is highly recommended that Resgrid is installed and setup by an IT Professional. There is a large amount of system configuration, tweaking and setup that is required to be done before you install Resgrid. Below is a list of technologies

that you should have skilled professionals available to you or requisite knowledge before installing Resgrid. Resgrid does not provide support or configuration guidance for those systems outside of the minimum needed to get the system functional. The steps outlined below will get the system in a bare minimum functional state to ensure it's working on your environment, to be production ready will require more effort than is outlined in this documentation.

- Windows or Linux
- Docker, Kubernetes
- SQL Server or PostgreSQL
- DNS, hostname mapping, proxy configuration
- RabbitMQ
- Redis
- Elastic
- Mail Server SMTP, POP3
- Firewall and system hardening

### 4.2.2 System Requirements

The all-in-one docker installation is suitable for a department of around 50 personnel on a machine with 32GB of RAM, 500GB of storage and a 8 logical processors. But depending on call volume or user interaction patterns may require more.

We do not recommend that mission critical systems be installed on a single machine. Resgrid is split into multiple containers to allow for multiple machines to be used.

A mission-critical production environment will require a minimum of 10 servers: \* 2 Load Balanced Web servers \* 2 Load Balanced API servers \* 1 Microsoft Sql Server \* 1 Worker server \* 1 Events server \* 1 Redis server \* 1 RabbitMQ server \* 1 Elasticsearch server (ELK)

Sizing of these servers will depend on your departments amount of users and call volume.

### 4.2.3 Prerequisites & Dependencies

To run the Resgrid containers you will need the following:

- Docker

Install *Docker* <<https://docker.com/>>, either using a native package or Docker Desktop.

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**Note:** All Resgrid container images are based on Linux, users of Docker for Windows will need to ensure that *Docker is using Linux containers* <<https://docs.docker.com/docker-for-windows/#switch-between-windows-and-linux-containers>>.

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- A minimum of 24GB RAM assigned to Docker

With Docker for Mac, the amount of RAM dedicated to Docker can be set using the UI: see *How to increase docker-machine memory Mac* <<http://stackoverflow.com/questions/32834082/how-to-increase-docker-machine-memory-mac/39720010#39720010>>.

In Docker Desktop for Windows, use the *\*Advanced\** tab to adjust limits on resources available to Docker <<https://docs.docker.com/docker-for-windows/#:~:text=Memory%3A%20By%20default%2C%20Docker%20Desktop,swap%20file%20size%20as%20needed>>.

- A limit on mmap counts equal to 262,144 or more

On Linux, use `sysctl vm.max_map_count` on the host to view the current value, and see *Elasticsearch's documentation on virtual memory* <<https://www.elastic.co/guide/en/elasticsearch/reference/5.0/vm-max-map-count.html#vm-max-map-count>> for guidance on how to change this value. Note that the limits **must be changed on the host**; they cannot be changed from within a container.

If using Docker for Mac, then you will need to start the container with the `MAX_MAP_COUNT` environment variable (set to at least 262144 (using e.g. `docker's -e` option) to make it sets the limits on mmap counts at start-up time.

- Docker Compose

Install *Docker Compose* <<https://docs.docker.com/compose/install/>>

- Open Ports 5151 through 5165
- SMTP Server for sending email

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**Note:** Any correctly configured SMTP server will work if it's local or not. If you have an SMTP server provided by your ISP or provider that will also work.

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## 4.2.4 Docker Compose Setup

### Download and Extract Package

Download the `resgrid.tgz` Asset file from the latest *Resgrid* *GitHub* *Release* <<https://github.com/Resgrid/Core/releases>>:

```
wget https://github.com/Resgrid/Core/releases/download/vXX.XX.XX/resgrid.tgz
```

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**Note:** Ensure you replace `vXX.XX.XX` in that url to the version number of the Github release you are trying to download.

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Extract the `tgz` package file:

```
tar -xvzf resgrid.tgz
```

You should now have a folder called `resgrid` in your current directory.

### Setting Environment Variables

Resgrid's docker containers are configured using environment variables defined in the `resgrid.env` file within the `resgrid` folder. Edit this file and configure the variables as needed for your environment. Please pay special attention to the the (required) variables.

### Run the Docker Compose

Once you have setup the environment variables you can now run the docker compose file.:

```
docker-compose up
```

That will run the interactive version of the containers, Ctrl+C will stop the containers.

If you want to run the containers in the background, use the `-d` option:

```
docker-compose up -d
```

The Resgrid system will take about 5 minutes to start up fully, this is due to the startup order of the containers. The last container to startup will be the `web` container, once that one is ready, you can now access the system.

### 4.2.5 Important Note About Support

Resgrid is a complex system that can scale from a single instance to dozens of systems to service thousands of users. These installation setups get your system into a state where you can test and validate locally on the install system. To get Resgrid up and running to service non-local users you will need to reconfigure and harden the system. To complete those steps and configuration the system to your organizational needs you will require an IT professional. We do not provide installation support outside this guide via our Github page.

### 4.2.6 Initial Web Login

Once you have completed the steps above you will be able to log into the web applications user interface. Open up a web browser and navigate to <http://localhost:5151>, you will then be prompted by the login screen. Your default administrator credentials are **admin/changeme1234**. Once you log into the system it's recommended that you change your admin password from the Edit Profile page by clicking on the Administrator name in the upper left hand corner.

## 4.3 Docker

In this section we will go over setup of the Resgrid system using Docker containers.

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**Important:** Resgrid requires working **RabbitMQ**, **Redis** and **SQL** servers, more info in *Prerequisites & Dependencies* below and currently only runs on Microsoft Windows operating systems

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This documentation is for installation of Resgrid from compile source. If you want to install Resgrid from Docker containers please review that section instead.

### 4.3.1 Requirements Notice

It is highly recommended that Resgrid is installed and setup by an IT Professional. There is a large amount of system configuration, tweaking and setup that is required to be done before you install Resgrid. Below is a list of technologies that you should have skilled professionals available to you or requisite knowledge before installing Resgrid. Resgrid does not provide support or configuration guidance for those systems outside of the minimum needed to get the system functional. The steps outlined below will get the system in a bare minimum functional state to ensure it's working on your environment, to be production ready will require more effort then is outlined in this documentation.

- Windows or Linux
- Docker, Kubernetes, Rancher, K8s
- SQL Server or PostgreSQL
- DNS, hostname mapping, proxy configuration
- RabbitMQ



- Redis
- Elastic
- Mail Server SMTP, POP3
- Firewall and system hardning

### 4.3.2 Docker Container Images

Resgrid is split into 3 distinct Docker containers. All of our container images are available under the Resgrid, LLC organization on the [Docker Hub](#).

**resgridwebcore** This is the web application docker image and is used to host the website application that users will interact with.

Docker Pull Command:

```
docker pull resgridllc/resgridwebcore
```

**resgridwebservices** This is the web api that is used by the website and applications to communicate with the Resgrid system

Docker Pull Command:

```
docker pull resgridllc/resgridwebservices
```

**resgridworkersconsole** This is the backend workers that are used to process operations from RabbitMQ or scheduled tasks.

Docker Pull Command:

```
docker pull resgridllc/resgridworkersconsole
```

### 4.3.3 Settings

To configure the Resgrid system in a Docker or Kubernetes context we recommend using environment variables. To see all the config options availabe you can take a look at our Github repo <<https://github.com/Resgrid/Core/tree/master/Core/Resgrid.Config>>, every *static* class in the Resgrid.Config project can be set by an environment variable.

The pattern for how Resgrid processes environment is as follows:

RESGRID\_{CLASSNAME}\_{PROPERTYNAME}

Resgrid at the start of the name must be in all caps, there are two (2) underscores seperating the parts, in between RESGRID and classname and classname and popertyname.

Table 1: Resgrid Environment Variables

Variables	Re- quired	Description
RESGRID__CacheConfig__RedisConnectionString	Yes	The full connection string to the Redis server or cluster
RESGRID__DataConfig__ConnectionString	Yes	The connection string to the Microsoft SQL Server
RESGRID__ExternalErrorConfig__ExternalErrorServiceUrl	No	URL for Sentry.io error reporting
RESGRID__InboundEmailConfig__DispatchDomain	No	Domain name to put at the end of the dispatch email address
RESGRID__InboundEmailConfig__GroupMessageDomain	No	Domain name to put at the end of the group message email address
RESGRID__InboundEmailConfig__GroupsDispatchDomain	No	Domain name to put at the end of the group dispatch email address
RESGRID__InboundEmailConfig__ListsDomain	No	Domain name to put at the end of the distribution list email address
RESGRID__ServiceBusConfig__RabbitExchangeName	Yes	RabbitMQ exchange name (can be blank)
RESGRID__ServiceBusConfig__RabbitHostname	Yes	Hostname or IP Address of the RabbitMQ server or cluster
RESGRID__ServiceBusConfig__RabbitUsername	Yes	Login for RabbitMQ that has permissions to create queues and publish and recieve messages
RESGRID__ServiceBusConfig__RabbitPassword	Yes	Password for the RabbitMQ login
RESGRID__SystemBehaviorConfig__ApiTokenEncryptionPassphrase	Yes	Passphrase to encrypt API tokens with
RESGRID__SystemBehaviorConfig__DoNotBroadcast	No	True/False prevents any communications from being sent if set to True
RESGRID__SystemBehaviorConfig__ResgridApiBaseUrl	Yes	URL for the Resgrid API for this Resgrid install
RESGRID__SystemBehaviorConfig__ResgridBaseUrl	Yes	Base url to access the web install of Resgrid

**Note:** The above is only a partial list to get the Resgrid system functional. You may need to set others to get the system fully operational within your environment. At a minimum, Microsoft SQL Server, Redis and RabbitMQ are required as well as setting the ResgridAPI url and ResgridBase web url.

## 4.4 Setup

This is the guide to getting your Department configured in the resgrid system. This setup guide is a high level overview of the settings to get your department up and running with Resgrid both the OnPrem and Hosted versions of the system.

**Note:** Only one person in your department or organization needs to sign up for a new Resgrid department, when you create an account from the Resgrid homepage this happens automatically. If this is an on-premises installation, use the default department information to log in.

### 4.4.1 Getting Started

Once you have your first user registered with Resgrid (or using the default OnPrem department) you can log into the system. The first page you will land on will be the dashboard page or home page. Here is a list of your personnel, groups and their statuses. You can also set your status and staffing level on the widgets on the right hand side. In the top of the screen you can click your name in the left hand side to view or update your profile. The 2 icons in the middle are your active calls and your inbox messages. The menus on the right are your Department Menu (it's the name of your department) and is the primary location to configure your department, a help menu and a logout button.

Table 2: Department Menu Items

Item	Visibility	Description
Department Settings	Admins Only	General Department settings like name, main address, time zone and resets.
Stations & Groups	Admins Only	Create and Manage Groups and Membership in those Groups
Call Import Settings	Admins Only	Call Email Import Settings and Call Auto Close (Prune) Settings
Custom Statuses	Admins Only	Create Department Specific Personnel and Unit Statuses and Staffing Levels
Text Messaging	Admins Only	Type of Inbound Text Messages allowed (Call or Command)
Api Settings	Admins Only	Allocate a System level API Key and Key for Active Calls RSS Feed
Types	Admins Only	Manage Department Wide Types (Call Types, Call Priorities, Unit Types, Certifications)
Distribution Lists	Admins Only	Create and Manage Membership is custom defined email distribution lists
Security & Permissions	Admins Only	Configure Permissions (i.e. who can create calls) for the department and view Audit Logs
Subscription & Billing	Admins Only	Manage your departments subscription and billing information. (Hosted Version only)
Orders	Everyone	Your Resource Order Requests and those from other departments (i.e. Mutual Aid)
Links	Everyone	Links with other Departments in Resgrid (i.e. sister stations)
Notifications	Everyone	Create and Manage your custom notifications (i.e. be notified if a unit goes out of service)
Commands	Everyone	Create and manage Command definitions for call types (for the Commander app)
BigBoard	Everyone	A configurable dashboard where you can see your departments info at a glance on a TVMonitor

**Note:** Main administrative operations (both department and group) are only available to be performed via the website. The Mobile application (like Resgrid Responder) are intended for personnel specific functions, like setting ones own status or staffing level, or viewing call information.

#### 4.4.2 Department Settings

After you log into the website, click your department menu, it's the name of your Department in the upper right hand corner of the web application next to the Help menu. The menu will drop down and expose a list (detailed above), click on Department Settings.

Table 3: Department Settings Options

Setting	Description
Department Name	The name of your department or how you want it displayed in Resgrid
Time Zone	The primary time zone your department is in. If your department is in multiple time zones, this should be the time zone of your headquarters or main office.
Use 24-Hour Time	Do you want time displayed in 24 hour format for your department? For example 8:00PM is 2000 in 24 hour format.
Managing User	This is the 'master' admin for the Department and that user cannot be removed from the system.
Disable Auto-Available	By default the Resgrid system will ignore personnel statuses (instead just showing "Standing By") submitted after an hour when displaying their current status in a list. Checking this box will disable that feature.

The Address section should be your home office, headquarters or main location. This will be used as the default center for most of the maps. Centers can also be adjusted in each map as well.

Personnel Staffing Reset will add a Staffing level (selected in 'Reset Staffing Level To') for every user in the Department at the specified time. For example if you want to ensure all personnel staffings are up to date every day at 0800, you can have the system set a default staffing, like Unavailable, at 0200 so you know if there is a different staffing it's accurate as of that morning.

Personnel Status Reset will add a Status (selected in 'Reset Status To') for every user in the Department at the specified time. For example if you want to ensure all personnel statuses are up to date every day at 0800, you can have the system set a default status, like Standing By, at 0200 so you know if there is a different status it's accurate as of that morning.

Force Department Update will clear out all of the in memory cached information for your department. This is a scheduled job and can take up to 15 minutes to process. Resgrid caches a lot of static data, like groups and group names, personnel names, etc that don't change frequently and store them in memory for fast access. Forcing a Department Update will clear that cache and force it to be pulled from the Database. This will negatively impact your performance until all data is recached.

**Warning:** Forcing a Department Update to clear the cache should only be used if some data, i.e. a group name or personnel name, is not updated for EVERYONE, not just one computer or phone. That device may have cached the output or call itself. This operation will slow down the system for ALL USERS until the cache is rebuilt.

### 4.4.3 Creating Groups

After you log into the website, click your department menu, it's the name of your Department in the upper right hand corner of the web application next to the Help menu. The menu will drop down and expose a list (detailed above), click on Stations and Groups.

Resgrid has 2 types of groups Station and Organizational. Station groups require a physical address and are the only group types allow to have Units under them. A Station group is intended to denote a physical location that personnel or units may be responding out of, or responding to (i.e. to pick up some equipment or staff). Organizational groups have no physical location and are intended to allow users to be grouped together. For example you can use Organizational groups like East or West denote which users are in those response areas.

**Note:** Users can only be in 1 group at a time, but a user can be a part of many roles. Ideally you would use Groups to define something static like Stations, Districts, Response Areas, etc and use Personnel Roles to define more dynamic

information like if a person is a Paramedic or HAZMAT Technician.

On the Department Groups list you'll see columns calls "Dispatch Email" and "Message Email". These are unique email addresses for those groups. The "Dispatch Email" address will create a call for that specific group and dispatch all personnel and units under that group. The "Message Email" address will create a in-system message in Resgrid to all personnel in that group.

## Organizational Groups

Organizational groups are intended to organize groups of users. This group type can only have personnel assigned to it.

## Station Groups

Station groups can have personnel and units assigned to them and must have a physical address. This address could be a building or open staging area.

## Add Group Page

Table 4: Creating a Group Options

Setting	Description
Group Type	The type of group you want to create Organizational or Station
Group Name	The name of your group
Parent Group	You can have a group under a group, if you want this newly created group to show up underneath another group select the parent group here
Address	Optional. If you have selected a Station group you need to supply a physical address for this group. An example would be a Fire Station, Staging Area, Ambulance Bay, etc.
Group Admins	These are the administrators for this group. Group Admins can modify personnel in the group, for example updating their profile
Group Users	Personnel that are in the group

**Note:** You do not have to add personnel here, you can leave both Group Admins and Group Users blank and add users to the groups when you add the users or edit their profiles. For very large groups the list of personnel in the group will be too big to maintain here and is best maintained at the personnel profile level.

## 4.4.4 Personnel Roles

After you log into the website, click the Personnel module from the left hand module list, it's under your name, Home and Calls buttons. This will take you the Personnel Section, there is a blue button on the right hand side of the screen, below the top bar with "Help" and "Log out" named "Manage Roles", this is where you can administer your Personnel Roles.

Personnel can be in any number of Roles; roles are used to define attributes of your personnel, for example it could be an MOS or Job Function like Firefighter, Paramedic, Officer, etc or could be ranks or roles within your organization like Manager, Supervisor or Coordinator. Roles allow you to filter personnel when making calls, sending messages,

assigning trainings and the like. For example say you have a training for your EMT's, you can have roles for your EMT's, AEMT's and Paramedics and assign the training just to them.

Once you create the role, you can click "Edit" in the roles list to assign personnel to that role. Additionally the recommended way to assign personnel to roles is via the personnel profile view (accessible by editing the person from the Personnel list, or clicking their name on the dashboard). When adding a person to the system you can assign roles at that time as well.

## 4.4.5 Adding Personnel

After you log into the website, click the Personnel module from the left hand module list, it's under your name, Home and Calls buttons. This will take you the Personnel Section, from here you can add personnel in 2 ways, manually or via an invite.

### Add a Single Person

Clicking the turquoise "Add Person" button on the Personnel list page will allow you to add one user one by one. This is the preferred way to add personnel into the system by Department or Group Admins as it allows you to specify all the information for the user at the time of entry.

Table 5: Creating a Group Options

Setting	Description
UserName	The Username that the user will use to log into the system with
Password	The password that the user will use to log into the system
Confirm Password	Ensure the password is correct
ID	Optional, the Identification number for the person. This could be a badge or employee number.
First Name	The users First Name
Last Name	The Users Last Name
Email Address	Email address for the user, this email address is used for communication and is the "Forgot Account" email address.
Group	The Group (Station or Organization) that the user should be placed under
Is Group Admin	Do you want this user to be a Group Admin for the group they are assigned
Roles	Personnel Roles that are applicable for the user
Mobile Number	The mobilecell phone number for the user
Mobile Carrier	The mobile carrier for the users mobilecell phone. This is required as Resgrid will route text messages directly to the carrier for the cell phone.
Call Options	How do you want this user to be communicated to for DispatchCalls
Message Options	How do you want this user to be communicated to for Messages
Notification Options	How do you want this user to be communicated to for Notifications
Notify User	Do you want Resgrid to email the user with their account information

### Send Out Invites

On the Personnel list page you can click the green "Manage Invites" button to invite personnel by sending out an invite email to their email address. On this page you will see the email address you have sent invites too and when you sent

that invite. Also on this list you can see if the user has completed the invite and resend the invite if the user has not completed it.

To send invites to email addresses you can enter them in, one or many at a time, in the “Email Addresses” textarea inside the “Send Invites” card. Email addresses in this textarea need to be comma “,” separated. For example “[user1@yourcompany.local](#), [user2@yourcompany.local](#), [user3@yourcompany.local](#)” without the double quotes. Once your list is populated you can click the blue “Send Invites” button.

---

**Note:** It’s recommended to send 20 invites or less at a single time to ensure the POST request length is not too large which could cause failures for browsers with a poor connection. If an email address supplied in the textarea doesn’t appear in the list there was an error processing that email address and an invite was NOT sent to that user.

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#### 4.4.6 Units Metadata

#### 4.4.7 Adding Units

### 4.5 Configuration

In this section we have all the configuration option for the system broken out into their functional area.

#### 4.5.1 Department Settings

Stations & Groups

Call Import Settings

Custom Statuses

Test Messaging

Templates

Protocols

Types

Distribution Lists

Security & Permissions

Subscription & Billing

#### 4.5.2 Calls & Dispatch

The core part of the Resgrid system is the Calls (Dispatch) facilities. Calls can be created in the system by hand, through external applications or tools, like the Resgrid Responder app or Dispatch app, can be created by importing emails or data payloads like JSON or XML, or even directly by api call.

### Protocols

Protocols also known as Dispatch Protocols, are department defined procedures, actions, SOPs, etc that should be followed during an operation. For example the most common Protocol in the Resgrid system is the Dispatch version that activates when a new call is created in the system.

## 4.6 Providers

Resgrid utilizes a number of providers, or 3rd party services, to perform essential functions, like sending push notifications. This section will detail all 3rd party

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**Important:** All of the 3rd party services, for example for sending Text Messages (SMS/MMS) require you to sign up and create an account with them.

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### 4.6.1 Service Bus

### 4.6.2 Push Notifications

### 4.6.3 Outbound Text Messaging

### 4.6.4 Inbound Text Messaging

### 4.6.5 Telephone Voice Calling

## 4.7 System

## 4.8 Apps

Below you will find the high level documentations and information for the external Resgrid applications. We have a number of external applications that run the gambit from mobile applications to web apps to desktop apps.

### 4.8.1 Resgrid Relay

Resgrid Relay allows you to listen to an audio feed, i.e. from a scanner, and monitor for tones and record the audio and dispatch personnel via Resgrid.

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**Note:** You can download releases for Resgrid Relay on it's [Github Releases page](#)

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Before you begin you will need the following:

- The tones frequency(s) you want to monitor in integernumber format i.e. 153
- A Windows 7 or newer computer with an Audio Line In connection or a usb audio sound card like [StarTech.com 7.1 USB Sound Card](#)
- A scanner like [WS1065](#) with an Audio Line Out connection



## Installing Resgrid Relay

Download the latest release from [Github releases page](#). This will be a zip file that you need to unzip the file on your computer [How to Unzip Files on Windows](#) and we recommend putting the resulting folder in C:\ResgridRelay.

From Windows Explorer run the

Using Notepad

Table 6: IIS Options

Section	Sub Section	Option
Web Management Tools		IIS Management Console
World Wide Web Services	Application Development Features	.Net Extensibility 3.5
World Wide Web Services	Application Development Features	.Net Extensibility 4.7
World Wide Web Services	Application Development Features	ASP.NET 3.5
World Wide Web Services	Application Development Features	ASP.NET 4.7
World Wide Web Services	Application Development Features	ISAPI Extensions
World Wide Web Services	Application Development Features	ISAPI Filters
World Wide Web Services	Common HTTP Features	Default Document
World Wide Web Services	Common HTTP Features	HTTP Errors
World Wide Web Services	Common HTTP Features	HTTP Redirection
World Wide Web Services	Common HTTP Features	Static Content
World Wide Web Services	Performance Features	Dynamic Content Compression
World Wide Web Services	Performance Features	Static Content Compression
World Wide Web Services	Security	Basic Authentication
World Wide Web Services	Security	IP Security

## 4.9 Development

In this section we will go over all the steps needed to develop against the Resgrid solution.

### 4.9.1 Prerequisites & Dependencies

The following server dependencies need to be installed, configured and functional:

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**Note:** Please ensure your Windows system is up to date with all Windows and Microsoft updates before installing the Resgrid System.

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- [.Net Framework](#) .NET Framework 4.6.2 (Developer Pack)
- [RabbitMQ Server](#), version 3.6.0 or newer
- [Microsoft SQL Server](#), version 12.0 (SQL 2014) or newer
- [Microsoft IIS](#) version installed on Windows 8 or newer or Windows Server 2012 or newer
- [Docker for Windows Desktop](#) Docker for Windows Desktop
- [Microsoft Visual Studio 2017](#) Community or Higher
- [Google Chrome](#) Chrome 71 or newer
- [Elastic ELK](#) 6.6.0 or newer

**Note:** If your not running a Professional (Pro) version of Windows you may not be able to install Docker for Windows Desktop. You will get an error opening up the ResgridCore solution with Visual Studio but your can just unlock the docker project under the Docker solution folder.

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### 4.9.2 Getting the Code

You can download the Resgrid Core source from our GitHub page [Resgrid Core Github](#).

### 4.9.3 Opening in Visual Studio

Open the ResgridCore.sln file in your version of Microsoft Visual Studio 2017. You will be prompted by a “Security Warning” dialog box, you can confirm for every project, but if you uncheck “Ask me for every project in this solution” you only need to be prompted once.

If you get an error opening the solution up Visual Studio this could be because you don’t have Docker installed (it can’t be installed on all versions of Windows) so you can expand the Docker folder in the Solution Explorer right click “docker-compose” and click “Unload Project”. This will allow you to open and compile the solution without any error. If you do have Docker installed on your computer, ensure that it’s running.

Open up the Web folder in the “Solution Explorer” and right click the “Resgrid.WebCore” project and select “Set as Startup Project”. This will mean that when you run or debug the solution a web browser will open up defaulting you to the Web project.

### Restoring Dependencies

Once you have the solution open correctly you need to download all the dependencies for the project. Right click the “ResgridCore” solution and click “Restore Nuget Packages”, this will download all the .Net dependencies for the solution.

Next you need to restore the bower and npm dependencies for the Resgrid.WebCore project. Expand the Web folder in the “Solution Explorer” and expand the “Resgrid.WebCore” project, At the root of that project there are 2 files; bower.json and package.json that we will be working with. Right click “bower.json” and select “Restore Packages” this will download all the bower dependencies. Next right click “package.json” and select “Restore Packages”.

### 4.9.4 Solution

## Folders

Table 7: Solution Folders

Folder	Description
Common	Contains common files that may be included in other projects, like the AssemblyInfo file
Core	Central libraries utilized throughout the system
Docker	Projects related to setting up and managing Docker
Documentation	Notes and Documentation
Providers	High level external integrations, like Geolocation or Text Messaging
Repositories	Data Storage Repo
Tests	Unit and Integration Tests
Tools	Non-Web UI tools and applications
Web	The main applications, the web application and the services (api) application
Workers	Backend workers

## Projects

Table 8: Solution Projects

Project	Description
Resgrid.Config	Primary system configuration options controlling the entire system
Resgrid.Framework	Shared helpers and common functions, like error logging that are used in every layer
Resgrid.Model	Data model objects, event objects, interfaces for servicesproviders and system metadata, like enumerations.
Resgrid.Services	Business logic layer services, both discrete and composite
Res-grid.Providers.AddressVerification	External address verification providers
Resgrid.Providers.Audio	External audio manipulation providers
Resgrid.Providers.Bus	Azure Service Bus and System Eventing
Res-grid.Providers.Bus.Rabbit	RabbitMQ bus provider
Resgrid.Providers.Cache	Redis and Internal (In Memory) caching provider
Resgrid.Providers.Claims	Rights and Claims system for the Web Application
Res-grid.Providers.EmailProvider	External email providers (Postmark)
Resgrid.Providers.Firebase	Firebase external provider used for the real-time database (Chatting)
Res-grid.Providers.GeoProvider	Geolocation provider for getting Latitude and Longitude for Addresses and vice versa
Resgrid.Providers.Marketing	External provider for working with an email marketing system
Res-grid.Providers.NumberProvider	Number, SMSMMS provider (Twilio and Nexemo)
Res-grid.Providers.PdfProvider	External PDF integration provider
Res-grid.Providers.AddressVerification	Address verification, testing if address are correct
Res-grid.Repositories.DataRepository	Primary Data Store, SQL Server both Entity Framework and Dapper
Resgrid.Tests	Unit Testing
Resgrid.Console	CLI Application for interacting with the Resgrid system
Resgrid.Web.Services	RESTful APIs (Services)
Resgrid.WebCore	Primary Web Application (User InterfaceWebsite) that users will interact with
Resgrid.Workers.Console	CLI Application that needs to be running at all times, contains back end workers for the Message Bus
Resgrid.Workers.Framework	Logic for the async workers that the Workers.Console runsmonitors

## 4.10 Contributing

## 4.11 Indices and tables

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