



Conrail[®] Base Station Pre-Installation Planning

Software Version 8.0.X

CORPORATE HEADQUARTERS

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Introduction

This document discusses pre-installation considerations and provides guidelines to ensure that your installation of Contrail® Base Station proceeds smoothly. It provides an overview of server hardware, network and operating system requirements and some additional information to prepare for installation.

Before you install Contrail Base Station, we urge you to consider the time required to complete the process. Although the installation process itself does not take long, making sure that your organization is ready to install the software and associated hardware are keys to a successful installation and system deployment. This document is intended to provide a generic guideline as each organization has many variables, including the number of users, network specifications, size of system, etc.

Customer Pre-Installation Checklist

There are certain steps that you must take before installation of Contrail Base Station can take place. We recommend that you read this document in its entirety in order to fully understand the pre-installation requirements. A checklist on page 14 of this document will assist you in coordinating and planning the installation tasks.

Planning your installation

The four key areas of consideration to smooth the process of installation are:

- ✓ Time
- ✓ Pre-Installation Plan
- ✓ Hardware
- ✓ Services/Training

Time

Following receipt of a purchase order/contract, please allow four to six weeks prior to doing an onsite installation to allow for pre-installation planning, reviewing hardware and network requirements, and lead-time for any hardware purchases.

Pre-Installation Plan

Involve and get a commitment from all appropriate personnel for your installation plan; create a cross-functional installation team (IT/network administrators, end users, management, etc.) with a designated lead. The following should be considered as part of your pre-installation plan. (For reference, detailed System Requirements are provided later in this document).

- ✓ Understand the Contrail Base Station system and server requirements.
- ✓ You will need ports open for services including remote connectivity.
- ✓ Set up Wide Area Network (WAN) address and Network Address Translator (NAT) to internal server Local Area Network (LAN) address.
- ✓ Set up (1) one domain name registered to WAN address for Contrail and one (1) for Contrail Inventory *plus*. Three (3) additional sub-domains will be required if Pan and Zoom map tiles are hosted locally on your server.
- ✓ If you plan to deploy a public website, set up network URL addresses and establish firewall rules to allow external access.

- ✓ Consider application groups and users access and privilege levels.
- ✓ Are you planning a two-server architecture? Consider network connectivity, firewall access, etc. Identify which will be the primary server and which will be the secondary. Determine failover process.
- ✓ If you plan to run the installation in a secured data center, please contact OneRain's [Contrail Support](#) to establish network use for system support, software updates and maintenance.

Network Connectivity & Configuration

- ✓ Location of network drops for Contrail Base Station server(s).
- ✓ Network drop for IP/ Serial Port device(s) for serial-to-network connectivity.

Hardware

- ✓ Contrail Base Station operates on a Linux®-based server architecture.
- ✓ Allow a **2- to 3- week** lead time + shipping time to order server.
- ✓ IP/Serial Port(s): [Digi PortServer® TS](#) devices (minimum 2- or 4-port recommended).*
- ✓ Custom cables or adapters necessary to split existing serial data feed.*

***NOTE**

A **Custom Serial-to-IP Connection Kit** is available to purchase from OneRain. The device will be pre-programmed and pre-configured by OneRain for your specific site requirements for ease of installation and setup.

Contrail Base Station Training

Contrail Base Station is a dynamic product with many features. Our on-site training ensures you gain the maximum value from your OneRain software and products and enables you to confidently utilize the product in its entirety. OneRain provides in-depth end-user, system administrator and server administrator training with your own system and data. Training includes:

- ✓ **System Administration Training:** Detailed training on server access and usage. Full description and details of the architecture of the system, how all the components interface and details of each component. Troubleshooting and problem solving processes are covered. This advanced training is designed for those responsible for maintaining the servers, applying software upgrades and performing system failovers.
- ✓ **Contrail Administrator Interface:** Setting up users and authorizing privilege levels, establishing sites and sensors, creating validation formulas, setting thresholds and creating alarm rules and notifications, acknowledging and clearing alarms, accessing alarm logs, accessing standard maintenance reports, modifying themes, adding content and links.
- ✓ **Contrail User Training:** Detailed user interface, viewing data with map view and site lists; drilling down to sensor data. Use of single and multiple graphs. Retrieving historical data and exporting data. Overview of detailed help system.

Additional Considerations

- ✓ **Maps.** Calculate the extents of your map regions in decimal degrees. Contrail can host multiple map regions, offering regional and zoomed in views.

- ✓ **Site and Sensor Definitions** (see <http://contrail.onerain.com/help/Import.xls> to download template for minimum requirements for site and sensor creation). Not required if upgrading from DIADvisor™.
- ✓ **Identify site groupings** such as watersheds, water basins, fire borders, or other logical groups or views.
- ✓ **Collect additional information** to enhance the Site and Sensor metadata. Site images, maintenance or public notes about the installations, sensor thresholds, and compile historic events such as maximum values during storms.
- ✓ **Alarms and Notifications.** Consider types of notifications and alarm evaluations to be used in your real-time monitoring. Contrail can trigger alarms for any sensor or group of sensors within your program. Who will receive the notifications? Different messages can be delivered to different people all from the same triggered event.
- ✓ **Determine default** validation criteria for Sensor Types. The default validation will be used as the baseline for new sensors.
- ✓ **Historical data transfer.** Catalog and validate existing datasets.
- ✓ **Contrail Inventory** data preload and import. If you have your data in an existing spreadsheet, transfer or format it to Contrail's import template (see <http://inventory.onerain.net/help/import.xls> to download template for inventory data).
- ✓ **Theming** Contrail's user environment to match your organization's look and feel. Choose an existing Web site as the template for the theme, or collect logo images, color swatches to be used.

Contrail® Base Station Platform Requirements

Operating System

The operating system we support is 64-bit CentOS 8, which is the free, open-source version of Red Hat 8 and is what OneRain utilizes. Operating System installation support is covered in OneRain’s setup pricing. During setup the “Minimal” software group install is selected. One (1) Contrail Base Station software License is required per server. Additional Contrail Base Station licenses may be purchased for deployment on each additional server.

Server Requirements

OneRain recommends installing the Contrail software on a virtual machine within a larger IT system if proper infrastructure and support is available. If a dedicated physical server is required, we typically install our software on Dell® PowerEdge Servers. Choose a **rack or tower solution**, whichever form factor best suits your server environment.

Minimum Virtual Server Requirements

- **CPU:** Dual Core 2.0 GHz
- **RAM:** 4 GB DDR-2
- **Data Storage:** 100 GB
- **Operating System:** CentOS 8 (free open source version of Red Hat 8) 64-bit Linux
- **Automated Snapshots:** weekly

Minimum Physical Server Requirements

- **CPU:** Dual Core 2.0 GHz
- **RAM:** 4 GB DDR-2
- **Optical Drive:** DVD-ROM
- **Disk Configuration:** RAID 1 Hardware (mirroring)
- **Data Storage:** 100 GB
- **Operating System:** CentOS 8 (free open source version of Red Hat 8) 64-bit Linux

Minimum Network Requirements

- Broadband as defined by the Federal Communications Commission (FCC).
- All load-balancing and packet inspection network devices should be configured to allow necessary network traffic to OneRain hosted services.

Incoming Network Ports

Some open network ports are required as follows:

Port	Use Description
80	Web Access to Contrail Web on the server
8080	Contrail Data Exchange interface
8181	Contrail Inventory application
3306	MySQL access
22	Default ssh port (sometimes moved to an off port for security)
60001 - 60010	reserved for Stormlink™ IP (logging queuing ALERT data collection)
60011 - 60020	Reserved for ALERT2 (feed from decoder to base station, usually via a serial to IP conversion).

Port	Use Description
60021 - 60030	Reserved for ALERT data collection (via serial to IP converter)
60031 - 60040	Reserved
60041 - 60050	Reserved for StormLink cellular data collection
60051 - 60060	Reserved for StormLink Satellite (IDP) collector
60061 - 60070	Reserved for ALERT two-way service

Outgoing Network Ports

The following outgoing ports are required for data feeds and software updates:

Port	Use Description
25	SMTP (Simple Mail Transfer Protocol). Required for Contrail to send emails and text messages from alarms. Also used to send reports and notifications of system events.
80 and 8080	Allows data agents to bring in data like USGS, METAR, or FFG.
IP Outgoing Access/ 443	Required for software updates: Red Hat (or CentOS), and OneRain (handles by allowing IP outgoing access to specific IP or ranges of IP addresses).
123	NTP service using UDP for time synchronization.

NOTE

Incoming and Outgoing ports between multiple servers must be allowed to enable two-way data communication and synchronization.

For dual configurations that include onsite Contrail Base Station with OneRain-hosted Contrail Server, ports assignments will be different than shown above. Contact OneRain for port assignments.

Supported Web Browsers

Microsoft Internet Explorer, Mozilla Firefox, Apple Safari, or Google Chrome (latest versions). Contrail works well on all popular mobile device platforms (latest versions).

Government Policy on Hypertext Transfer Protocol Secure – HTTPS-Only Standard

IMPORTANT NOTE

On June 8, 2015, the Whitehouse mandated HTTPS connection for Federal publicly-accessible websites¹. The directive instructs Federal agencies with publicly accessible websites to provide service only through a secure HTTPS connection that encrypts nearly all information during communication between the website and user.

(Reference M-15-13 Memorandum for the Heads of Executive Department and Agencies “*Policy to Require Secure Connections across Federal Websites and Web Services*”)

The strongest privacy and integrity protection currently available for public web connections is Hypertext Transfer Protocol Secure (HTTPS). HTTPS is a combination of HTTP and Transport Layer Security (TLS). TLS is a network protocol that establishes an encrypted connection to an authenticated peer over an untrusted network.

TLS/SSL is the de facto standard for encrypted and authenticated communications between clients and servers on the Internet.

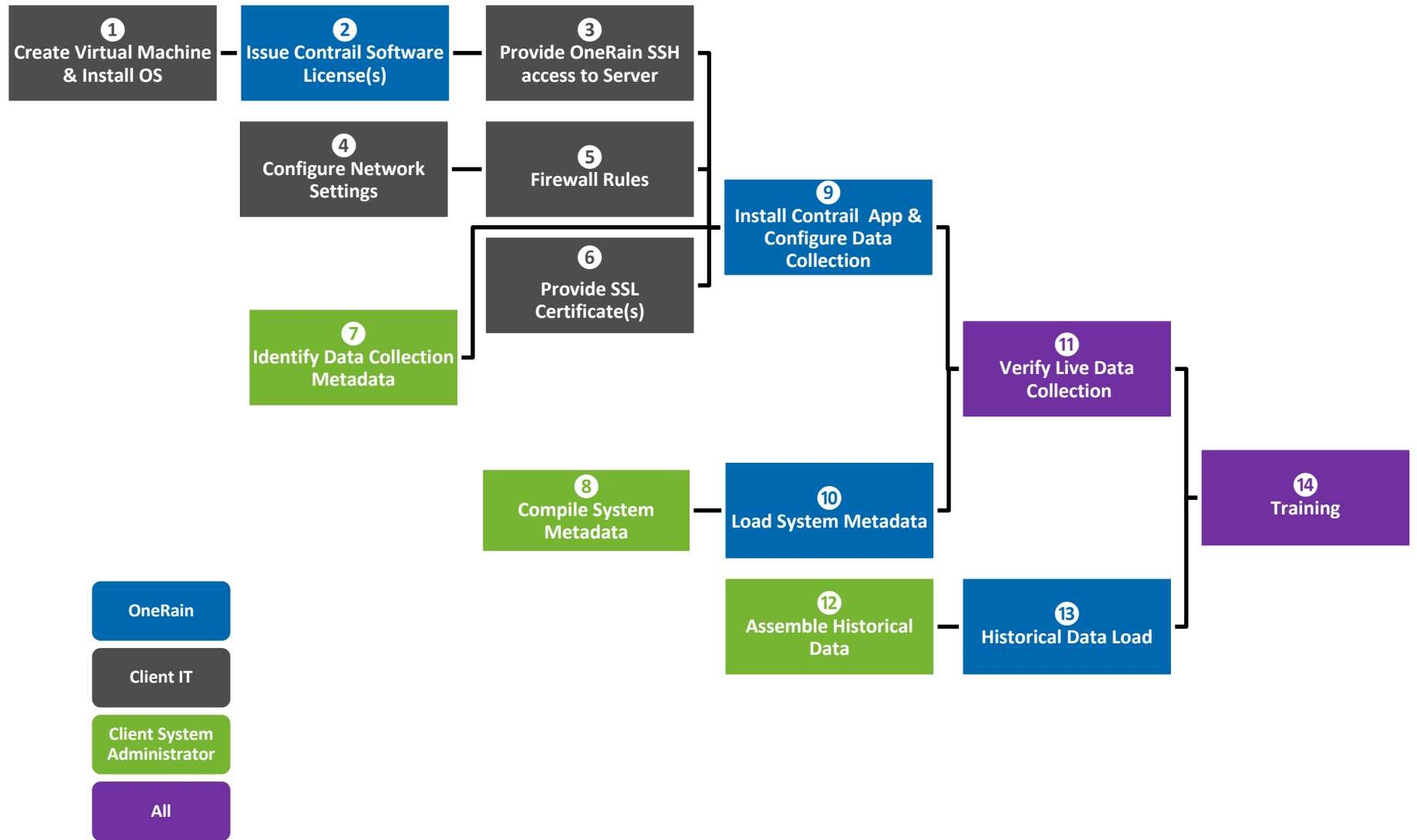
- ✓ Transport Layer Security (TLS) is the successor of Secure Sockets Layer (SSL); they are both cryptographic protocols that provide secure communications on the Internet for such things as web browsing, e-mail, Internet faxing, instant messaging, and other data transfers. There are slight differences between SSL and TLS, but the protocol remains substantially the same.
- ✓ A TLS/SSL certificate is required to enable encryption and authentication on your site domain and use the HTTPS protocol.
- ✓ Data between the browser and **Contrail** is encrypted. This is important for transmitting sensitive data like username and password.

Technical Assistance

Please visit <https://HTTPS.cio.gov> for technical assistance and best practices to aid in the implementation of this policy.

¹ Publicly-accessible websites and services are defined here as online resources and services available over HTTP or HTTPS over the public Internet that are maintained in whole or in part by the Federal Government and operated by an agency, contractor, or other organization on behalf of the agency. They present government information or provide services to the public or a specific user group and support the performance of an agency's mission. This definition includes all web interactions, whether a visitor is logged-in or anonymous.

Software Implementation Process for Virtualized Hardware



Steps	Tasks	OneRain	Client IT	Client System Admin.	All
1	Create Virtual Machine(s) & Install OS <ul style="list-style-type: none"> 64-bit virtual machine: refer to Contrail Pre-Installation Plan for server hardware requirements. Operating System: Red Hat® Linux® 8 or CentOS 8; Minimal Install (Note: OneRain will install all necessary software packages (MySQL, etc.) during the initial software application deployment). 		✓		
2	Issue Contrail Base Station software license authorization key(s)	✓			
3	Provide OneRain SSH Access to Server <ul style="list-style-type: none"> Provide OneRain SSH (secure shell) access to the Contrail Base Station server(s), typically via VPN. 		✓		
4	Configure Network Settings <ul style="list-style-type: none"> Configure necessary network settings (Local IP address, DNS, etc.). Determine WAN address and register public URL if applicable. 		✓		
5	Firewall Rules <ul style="list-style-type: none"> Ensure all firewall rules regarding required Contrail Incoming and Outgoing Network Ports are in place. 		✓		
6	Provide SSL certificate(s) <ul style="list-style-type: none"> Data between the browser and Contrail is encrypted. A TLS/SSL (Transport Layer Security/Secure Sockets Layer) protocol certificate is required to enable encryption and authentication on your site domain and use the HTTPS protocol. 		✓		
7	Identify Data Collection Metadata <ul style="list-style-type: none"> Identify application user access privilege levels. Identify site groupings: watersheds, water basins, fire borders, or other logical groups or views. Identify site images, maintenance or public notes, sensor thresholds, historic events such a maximum values during storms, etc. Determine default validation criteria for sensor types. Alarms and Notifications: Consider alarm evaluations and types of notifications. 			✓	
8	Compile System Meta Data <ul style="list-style-type: none"> Provide Data Collection System information. Provide Site and Sensor Meta-data definitions via Import Spreadsheet. 			✓	
9	Install Contrail Application & Configure Data Collection <ul style="list-style-type: none"> Install Contrail application(s) via SSH. Perform advanced configuration of data collectors, data agents and other services. 	✓			
10	Load System Meta Data <ul style="list-style-type: none"> As Identified in step 7. 	✓			
11	Verify Live Data Collection <ul style="list-style-type: none"> Confirm that data are being collected and correctly processed as expected. 			✓	
12	Assemble Historical Data <ul style="list-style-type: none"> Catalog and validate existing datasets to migrate to Contrail. 			✓	
13	Historical Data Load (if applicable) <ul style="list-style-type: none"> Optional professional services performed by OneRain for historical data transfer. 	✓			
14	Training <ul style="list-style-type: none"> Advanced Server Administrator. Contrail Application System Administration. Contrail General User. 				✓

Network Setup for Contrail Base Station on Enterprise Linux 8.X

A pre-installed Contrail Base Station is configured for DHCP (dynamic host configuration protocol) network addressing before shipment. Static network address configuration is recommended for server operations to allow routing of data. To access the server remotely for management and data viewing, either the IP address assigned to the server is an Internet-accessible IP, or Port Forwarding techniques can be used to permit communications from external hosts to access the server inside a local network.

Contact your network administrator to request the necessary network settings.

Local IP address: (192.168.1.100)	
Gateway address: (192.168.1.1)	
Subnet mask: (255.255.255.0)	
Primary DNS address:	
Secondary DNS address:	
External IP address:	
Network Ports:	<i>Review the documented ports in this Pre-Installation Plan (refer to pages 7 and 8 in this document)</i>

Connect and start the server

1. Connect an Ethernet cable between your network and the first Ethernet port on the server. The first physical Ethernet port on the server corresponds with the Linux Ethernet adapter **eth0**. Some servers label the Ethernet connections - choose the first physical connection.
2. Connect the monitor, keyboard, mouse, and server power cord.
3. Start the server. Press the **power button**.
4. You are prompted to enter **username** and **password**.

NOTE

Contact OneRain to request your **username** and **password** credentials.

To view current server network settings using ifconfig

1. View current network configuration of (eth0) tool.
2. Type on the command prompt:
ip a

Edit the server network settings using the command line

1. Open the text based network configuration tool. Type on the command prompt:
system-config-network
2. Use the keyboard <Tab> to navigate the interface. Use the <Enter> key to confirm an action. Use the <Space> key to select or un-select options.

3. Select Action > Device configuration.
4. Select a Device > (eth0).
5. Network Configuration:

Unselect "Use DHCP" to edit the static network information

Static IP = Local IP address

Netmask = Subnet mask

Default gateway IP = Gateway address

Primary DNS Server = Primary DNS address

Secondary DNS Server = Secondary DNS address

6. Save the network changes.
7. Select Action > DNS configuration.
8. DNS configuration:

Hostname = primary (machine name without spaces)
Primary DNS = Primary DNS address
Secondary DNS = Secondary DNS address
Tertiary DNS = (Optional)
DNS search path = onerain.net (organization may provide)
9. Save the network changes (Save & Quit).
10. Restart the server for changes to be applied. Type on the command prompt:
reboot

Customer Pre-Installation Checklist

There are certain steps that you must take before installation of Contrail Base Station can take place. The checklist below will assist you in coordinating and planning the installation tasks in preparation for a smooth and efficient installation of Contrail Base Station. **Send a copy of the completed form** to OneRain via email at customer.support@onerain.com (or fax 303-774-2037). Keep a copy for your records. To fill out the form electronically and then save and submit, you'll need [free Adobe® Reader®](#).

CONTACTS AND INSTALLATION SITE DETAILS <i>(to be completed by customer)</i>		
ORGANIZATION / BUSINESS NAME	DEPARTMENT / DIVISION	
STREET ADDRESS	CITY, STATE, ZIP	
PRIMARY CONTACT		
PRIMARY CONTACT NAME	PRIMARY CONTACT PHONE	PRIMARY CONTACT EMAIL
I.T. AND NETWORK ADMINISTRATION CONTACT		
I.T. CONTACT NAME	I.T. CONTACT PHONE	I.T. CONTACT EMAIL
OTHER CONTACT		
CONTACT NAME	CONTACT PHONE	CONTACT EMAIL

Task	Description	Check ✓		Notes
		Done	N/A	
Hardware				
1.	Provision for Server(s): Contrail Base Station operates on a 64-bit Linux®-based. Refer to Contrail® Base Station Platform Requirements on page 7.	<input type="checkbox"/>	<input type="checkbox"/>	
2.	IP/Serial Device: OneRain Custom Serial-to-IP Connection Kit, or other.	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Identify network drops for Contrail Base Station server(s).	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Identify network drop of IP/Serial Port devices.	<input type="checkbox"/>	<input type="checkbox"/>	
Network and System Requirements				
5.	Obtain SSL/TSL (HTTPS) certificate(s) for your website domain. Refer to section on "Government Policy on Hypertext Transfer Protocol Secure – HTTPS-Only Standard" on page 9.	<input type="checkbox"/>	<input type="checkbox"/>	
6.	Open Ports for services. Refer to section on Incoming and Outgoing Network Ports (pages 7 and 8). Consider firewall access, etc.	<input type="checkbox"/>	<input type="checkbox"/>	
7.	WAN address and NAT configured to internal server LAN address.	<input type="checkbox"/>	<input type="checkbox"/>	

8.	Register one (1) domain name to WAN address for Contrail and one (1) Contrail Inventory <i>plus</i> . Three (3) additional sub-domains are required if Pan and Zoom map tiles will be hosted locally on your server.	<input type="checkbox"/>	<input type="checkbox"/>	
9.	Determine network addresses for Public URL, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	
10.	Bandwidth: Broadband as defined by the Federal Communications Commission (FCC). (High speed is recommended when hosting a public website). All load-balancing and packet inspection network devices should be configured to allow necessary network traffic to any OneRain hosted services.	<input type="checkbox"/>	<input type="checkbox"/>	
11.	Determine application groups and users' access privilege levels.	<input type="checkbox"/>	<input type="checkbox"/>	
12.	Two-server architecture? Consider network connectivity, firewall access, etc. Identify primary and secondary server and failover process.	<input type="checkbox"/>	<input type="checkbox"/>	
13.	Secured Data Center? Establish network use for system support, software updates and maintenance.	<input type="checkbox"/>	<input type="checkbox"/>	
Software Application Data				
14.	Maps. Calculate the extents of your map regions in decimal degrees. Contrail can host multiple map regions offering regional and zoomed-in views.	<input type="checkbox"/>	<input type="checkbox"/>	
15.	Site and Sensor Definitions. Download and complete template for minimum requirements for site and sensor creation. http://contrail.onerain.com/help/Import.xls	<input type="checkbox"/>	<input type="checkbox"/>	
16.	Identify site groupings: watersheds, water basins, fire borders, or other logical groups or views.	<input type="checkbox"/>	<input type="checkbox"/>	
17.	Compile site and sensor metadata. Site images, maintenance or public notes, sensor thresholds, historic events such a maximum values during storms, etc.	<input type="checkbox"/>	<input type="checkbox"/>	
18.	Determine default validation criteria for sensor types.	<input type="checkbox"/>	<input type="checkbox"/>	
19.	Historical data transfer: Catalog and validate existing datasets.	<input type="checkbox"/>	<input type="checkbox"/>	
20.	Alarms and Notifications: Consider alarm evaluations and types of notifications.	<input type="checkbox"/>	<input type="checkbox"/>	
21.	Web theme: Collect logo, images, color swatches, etc., to be used to customize the website.	<input type="checkbox"/>	<input type="checkbox"/>	
22.	Contrail Inventory data. Download template for compiling inventory data. http://inventory.onerain.net/help/import.xls	<input type="checkbox"/>	<input type="checkbox"/>	
Other Considerations				
23.	Training: Identify who should be present for Server and Administrator level training. Identify who should be present for User only training.	<input type="checkbox"/>	<input type="checkbox"/>	

Technical Assistance and Support

Questions?

Receive guidance about supported hardware options and network configurations that can assist you with your decisions. OneRain technical assistance is available to warranty or maintenance contract customers who need technical assistance with a OneRain product.

Contact

OneRain Incorporated
1531 Skyway Drive, Unit D
Longmont, Colorado 80504

Technical Support

Email: contrail.support@onerain.com

Phone

303-774-2033

Toll Free

1-800-758-RAIN (7246)

More Information

Since 1992 OneRain has been providing high quality data and professional services to customers who need accurate rainfall and related environmental information to make high-value decisions. Our customers' critical missions include dam safety, flood warning, stormwater and wastewater management, and reservoir and hydropower operations.

Our vertical involvement in water measurement, from gauges through remote sensing and storm analysis, enables us to collect and distribute the best real-time and historical hydrometeorological data available. Our complete systems approach to hydrological management includes nationwide 24/7-supported enterprise data collection, archiving, notification and Web visualization services, local data collection software, gauge-adjusted radar rainfall estimation, rain and other hydromet gauging and professional services, gauge maintenance, real-time satellite telemetry services, telemetry system integration, storm properties analyses and consulting services.

OneRain has designed, built, rehabilitated, and maintains many hundreds of gauges throughout the country. Each gauge or system is tailored specifically to the customers' needs. OneRain continually strives to be the industry leader to the remote hydrometeorological world, consistently pushing the bar with new technology, while always maintaining quality service and support.

For the latest information about our products and services, please contact:

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