Installation Guide Celona Edge Appliances



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Introduction

This document provides the necessary guidance to help you install and configure the Celona Edge Appliances – namely, the Express Node, the Enterprise Node and the Enterprise Cluster.

About the Celona Edge Appliances

The Celona Edge Appliances are based on Intel's latest x86 architecture. They run the Celona Edge software to deliver the required control and data plane services for a private mobile network. These services include the enterprise optimized LTE packet core, domain proxy functions for CBRS spectrum in the United States, centralized encryption with SIM based authentication of wireless clients connected to the Celona access points (APs), among others.

Celona Edge Appliances are available in 3 hardware form factors -

- Celona Edge Express (1 RU)
- Celona Edge Enterprise Server (1 RU)
- Celona Edge Enterprise Cluster (3 RU)

Package Contents

Verify that you have received the items below. If any item is missing or damaged, contact Celona at support@celona.io for next steps.

- Celona Edge Express (1 RU)
 - US POWER CORD 18AWG
 - Screw and tie wrap kits
- Celona Edge Enterprise Server (1 RU)
 - US POWER CORD 16AWG
 - Screw and tie wrap kits
- Pair of rack mount rail sets
 - Inner and outer rail for 1U 17.2"W chassis



Hardware Specification



	Express Node	Enterprise Node
Network Interfaces	Two (2) 1G Base-T Two (2) 10G Base-T	Nine (9) 1G Base-T Two (2) 10G Base-T Two (2) 10G SFP+
Buttons	Power On/Off, System Reset	Power On/Off, System Reset
LEDs	Two (2) Network Activity LEDs Fan Fail/System Overheat LED HDD Activity LED Power Status LED	Network Activity LED Hard Drive Activity LED System Information LED Power Status LED
Power Supply (AC Power)	1U 200W Multi-output Power Supply Gold Level w/20pin	500W High-Efficiency Power Supply w/PMBus 1.2, 12C, and PFC

Powering the Appliance

The Celona Edge Appliance can be powered by connecting to a standard 110v AC power outlet.

Discovery, Provisioning & Configuration

The data port connects Edge appliance to the enterprise network and the Celona APs. And, the management port provides access to setup user interface (UI) for the appliance.

The Celona Edge Appliances support zero-touch provisioning and is pre-configured with details necessary to discover the cloud-hosted Celona Orchestrator automatically.

The Celona Edge Appliance should be located on a network segment that is reachable by the Celona APs across the enterprise network and have connectivity to the cloud-hosted Celona Orchestrator. Celona APs contact the Celona Edge as part of the setup process since Celona Edge helps with the radio management capabilities of the Celona APs and enables wireless clients to interact with the enterprise network.

In standard configuration, Data port on the Edge Appliance is configured to receive its IP via DHCP. Static IP address configuration of the data port is available via Edge setup manager as described below. Once the Celona Edge is online, it will connect to the Celona Orchestrator and will download its real-time configuration.





Edge Appliance Setup Manager

Edge Setup Manager is accessible on the Management port of the Edge appliance as a web-based UI. Plug-in a laptop to this port and use a browser to go to **https://192.168.1.10** to access the Edge Setup Manager UI.

Note: From 2406, Edge Manager is only accessible through the management interface unless explicitly enabled on the data interface. To enable Edge Manager on the data interface, one must enable the "Enable Edge Manager on Data Interface" field on the Network Configuration page on Edge Manager. Edge Setup Manager is a standalone UI implementation and has no relation to the Celona Orchestrator user interface currently. Prior to the release version 2402.edge, the UI was available at http://192.168.1.10:8081. Version 2402.edge and beyond will be https://192.168.1.10.

Change Password

Default username and password to access it is admin/Celona123. It is strongly recommended that this is changed after first login. You will be prompted to change the password on first login or you can change it in the "Change Password" page on the Edge Setup Manager Web UI

Network Configuration

The "Network Configuration" tool on Edge Setup Manager offers following features –

- Data port IP address allocation, Static vs DHCP
- Change of hostname and the management IP
 address
- Custom NTP server IP address, if the default ubuntu.pool.ntp.org is not used or there is no DHCP(Option 42) specified NTP configuration on the network.

If a static IP address is selected, user needs to provide the gateway IP address and the primary and secondary DNS IP addresses. Any configuration change would require a reboot of the appliance, as the Edge Setup Manager UI would highlight.

(•) cel⊛na	Edge Setup Manager	
€ Health Check ♦ Network Configuration	Change Password	
Troubleshooting	Old Password	
ev Change Password	New Password	
	Confirm New Password	
	Cancel Submit	

) cel⊛na	🛟 Edge Setup Manager	
Health Check Network Configuration	Network Configu	ration
Troubleshooting Change Password	Interface Name	enoll
	IP Address	172.2164.18
	DHCP	
	Select Data Interface:	RJ45 (eno11) 🗸
	Static IP Address *	172.21.84.18/22
		Static P format is CIDR (Classics Inter Demain Bouting), ex. 852868.9830(24
	IP Gateway	17640.051
	Primary DNS	10.003
	Enable edge manager on data interface	Changes may take 60 seconds to come in affect
	Hostname	bevolaksedge
	NTP Servers	Comma seperated list of IPs or blank for default
		Comma seperated IP Addresses. Empty defaults to ubuntupcoUntplorg DHCP/Castion 42) specified NTP configuration overwrites static configuration
	Management IP	192.168.1.10
	Cancel Submi	

Health Check

On logging into the Edge Setup Manager UI, you will land on the "Health Check" page.

This page tests connectivity to crucial external URLs/ports that the Celona network needs to interface with for network operation and management.

Interfaces include:

- Configured DNS and default gateway reachability in "Network Configuration"
- Celona Edge registration with the Orchestrator and other management function URLs
- NTP sync check
- Overall Celona Edge bootup status
- Certificate validity on the Celona Edge
- Access to Celona's remote monitoring tool (tp6)

na	Edge Setup Manager							
:k nfiguration iting	Health Check Software version: 2408.edge.0.0-75						Last	Run: 09/18/2024 22:27:20
sword	Test	Status	Dotails		Correcti	ve Action		
	DNS check	Mealthy	DNS server is reachable		-			
	Default gateway check	Mealthy	Default gateway: 172.21.64.1		-			
	Disk health	Moalthy						
	Docker subnet check	🖌 Healthy	Docker subnet is 172.17.0.0/16. overlapping with any other	Docker subnet is not subnets				
	EDGE registration	🖌 Healthy	Edge registration URLs are [p cso.celona.io psereg-v2-sta					
	KBs cluster join check	🛃 Healthy	This is not a HA setup		-			
	NTP check	X Unhealthy	hy System clock is synchronized, but NTP is not active			nfigure NTP in the I	Network Configuration	
	Node info check	🛃 Healthy	1000000054-0-1006000381-2 cluster id and node role is m	106442389 is the aster	-			
	Orchestrator connectivity	🖌 Healthy	Orchestrator URLs: [staging- beotstrap-staging-cso.celo	cso.celona.io na.io]				
	Pod status	🛃 Healthy	All pods are healthy	All pods are healthy				
	Server certificate validity	Moalthy	Valid certificates received from the servers		-			
	gRPC connection	🗹 Healthy	gRPC LB URLs are [grpclb-v2	staging-cso.celona.io]				
	tp8 check	V Healthy	tp8 server is reachable		-			
	Access Point SN	Admin state	Manual admin state	Last inform time(GMT)	Radio enabled	Radio opstate	Manual radio enabled	
	•							
	Rup Test							

Troubleshooting

Edge Setup Manager has limited debugging capabilities with ping, curl, iperf3 and ifconfig to help troubleshoot connectivity issues and test real-time network performance.

(•) cel⊚na	🔆 Edge Setup Manager
ඬ Health Check ✿ Network Configuration	Troubleshooting
@ Troubleshooting	Run] Blop
👳 Change Password	Commands: ping, lp, ifconfig, nsiookup
	Truckleshooting Tool Connected

Provisioning your Celona Edge Cluster using the Celona Orchestrator

- 1. Log in to the Celona Orchestrator, go to the Edge Clusters page and click the Create Edge Cluster button.
- 2. Give the Edge Cluster a name.
 - We suggest creating a naming convention that will help you understand what it is and where it is information required for ongoing operations. For example, for a virtualized Edge instance, locally hosted in the Denver office, you might use EDGE-DENV-1. You can include additional clusters per your network design.
- 3. Save your Edge Cluster Name.

=	celona	θ
	← Edge Cluster Details	
۲		
۲	Edge Cluster	Edge Nodes ADD EDGE NODES
0	Name EDGE-VM-DENV-1	Edge Node IP Address CPU (%) Memory (%) Type Role Status
88 60	ID 16-0-27-3336671650	tterns per page: 25 ▼ 0 of 0 < >
	IP Domains +	Time
•	Internal	Last 1 hour
	Nomo Start IP End IP NAT	
	Staff Devices 1020.01 1020.0253 Disabled	THROUGHPUT SESSIONS
	Items per page: 25 👻 1-1 of 1 < >	тнеочонрит

Note: It is recommended to have a minimum of one Edge Cluster for a production Celona network. Pilot networks can easily be supported via a single Edge cluster with one node.

Assign a Celona Edge Node to a Cluster using the Celona Orchestrator

- Hover over the left-hand menu to expand, then choose Edge Clusters. You should now see a list of available Celona Edge instances. These will be in Unassigned category and show up as New.
- 2. The screenshot below shows a single cluster with one node that has been configured and connected to the network while remaining unassigned to a specific site.

Edge	e Cluster	ſS											
_													
Edg	ge Clusters			Edge Nodes								CREATE E	DGE CLUSTER
^	1	• O		↑ 1	• O								
UP		Down		UP	Down								
											E	(PAND ALL	COLLAPSE ALL
No	ide Name		Not	ie ID		IP Address	CPU (%)	Memory (%)	Type	Role	Status		
Un	nassigned, (0)										~	
MI	LABCLUSTER,	20-0-21-1410073108	3 (1)			10.5.0.195					Up	~	
											Items per page: 5	▼ 1-2 of 2	< >



Note: In order to support VLANs within your enterprise network, Celona Edge switch interface should be a trunk port with native VLAN untagged for management and tagged VLANs for client traffic forwarding.

- 3. At this stage, you should have already deployed Edge Appliance Node on your network. If so, ensure your network policies allow communication between the Celona Orchestrator and any locally deployed Edge instances. This article provides detailed information on what ports and protocols must be allowed.
- 4. Click on the Edge Cluster and drill down into Edge Cluster details page.
- Click on Add Edge Node button (shown below) to add Edge Node to the Cluster

Additional Documentation

Please refer to our Getting Started Guide at <u>celona.io/start</u> for initial steps to take as you setup your own Celona mobile network.

Solution Architecture

The system consists of the essential functions detailed in the figure below. The Celona Orchestrator performs authentication, validates serial number and maintains configuration of the Edge. Celona Orchestrator also automates critical network operations – for instance, the radio frequency selection on the Celona APs with its Self-Organizing Network (SON) function, powered by machine learning.



Celona Edge acts as the data plane for the private LTE network and is managed via cloudhosted Celona Orchestrator. It shares network telemetry data with Celona Orchestrator and enforces network access policies on a per application, device group and network segment basis. Celona Edge – drastically simplifying integration with existing enterprise IT environment – can be deployed on-premise, in the private data center or in the cloud.

With a software architecture based on microservices, the Celona Edge enables its datapath performance to elastically scale as cloud-native software, eliminating the need to manage capacity one server at a time as number of CBRS LTE access points increase in count and/or as the number of connected devices scale.

Key Benefits

- Highly available and scalable As a cloudnative network OS, Celona Edge automatically clusters across multiple nodes and provides enterprise grade scalability without the operational complexity
- **High data plane performance** By leveraging intel DPDK architecture on standard x86 server hardware
- **Deployed as overlay** Seamlessly integrates with the existing enterprise IT network architectures
- **Plug-and-play experience** Remote provisioned via Celona Orchestrator for installation and ongoing configuration

Physical & Environmental Specification

	Express Node	Enterprise Node
Form Factor	9.8″ Mini 1U chasis	1U Rackmount
Dimensions (H X W X D)	1.7 x 17.2 x 9.8 (inches) 4.32 X 43.69 X 24.89 (cm)	1.7 x 17.2 x 15 (inches) 4.32 X 43.69 X 38.1 (cm)
Gross Weight	10 lbs 4.54 kg	25 lbs 11.34 kg
Operating Temperature	0° to 40° C	0° to 45° C
Storage Temperature	-40° to 70° C	-40° to 70° C
Humidity	8% to 90%	8% to 90%

Key Performance Specifications

	Express Node	Enterprise Node	Enterprise Cluster
Recommended Deployment	Branch or Small Offices	Large Branch or Medium Campuses	Large Campus
Recommended Number of APs	Up to 40 APs	Up to 125 APs Expandable by clustering with more Enterprise Nodes	Up to 300 APs Expandable beyond 3 nodes with additional Enterprise Nodes

Operations & Maintenance

Celona Edge is operationally managed via cloud-hosted Celona Orchestrator. Celona Edge performance is monitored periodically and if a fault surfaces, the fault is automatically propagated by the Celona Edge to the Celona Orchestrator.

Security

The certificates that are required to establish HTTPS connections with the Celona Orchestrator and the IPSEC channel with the Celona APs are installed on the Celona Edge Appliance at the factory. If the certificates need to be updated or replaced, the process is automatically triggered and managed by the Celona Edge. The certificates conform to the industry compliant X.509 standard. IKEv2 is used to establish the IPSEC tunnel between the Celona Indoor AP and the Celona Edge.

"Airgap" between IT & OT traffic

Air gapping IT and OT traffic is crucial for Industry 4.0, particularly in manufacturing. It ensures physical separation and segmentation of private 5G network traffic, while upstream traffic routing further separates IT and OT networks, enabling secure and efficient network segmentation.

The Celona Edge segments IT and OT traffic securely using VLANs and separate physical ports. In this example, RJ45 Port 1 routes OT traffic (video surveillance) to the OT network, while RJ45 Port 2 handles IT traffic (IT tablet) to the enterprise network, ensuring efficient management and security.

Name	Туре	* Name	 Туре		
Video-Surveillance	Layer 2 Layer 3	IT-Tablet	Layer 2 Lay	yer 3	
letwork Interface		Network Interface			
RJ45 Port 1		RJ45 Port 2			
RJ45 Port 2		VLAN ID			
10		20	\$		
eave blank to use default VLAN 'LAN IDs currently in use: 104,102,105		Leave blank to use default VLAN VLAN IDs currently in use: 104,102,105			
Device IP Allocation		Device IP Allocation			

Sample configuration for OT traffic (RJ45 Port 1):

Example configuration for IT traffic (RJ45 Port 2):

Solution Architecture

Here are the Edge Express and Edge Enterprise port mappings for RJ45 Port 1 and Port 2:





Support

Contacting Support

Celona support is available via <u>support@celona.io</u>.

Warranty

Celona Edge Appliances come with a 1-year limited warranty and are eligible for RMA advanced replacement, in which case the replacement hardware units will be shipped to the customer site within one business day following issuance of the RMA.

To request a return under the hardware warranty, customer must notify Celona or the Celona reseller or services partner within the hardware warranty period. To initiate a return directly to Celona, customer must send a return request to Celona at <u>support@celona.io</u>.

hello@celona.io

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