

## **Tech Note:**

### **Simplifying eSIM Cellular Plan Activation with Jamf**

Jamf Implementation Engineering  
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# Introduction

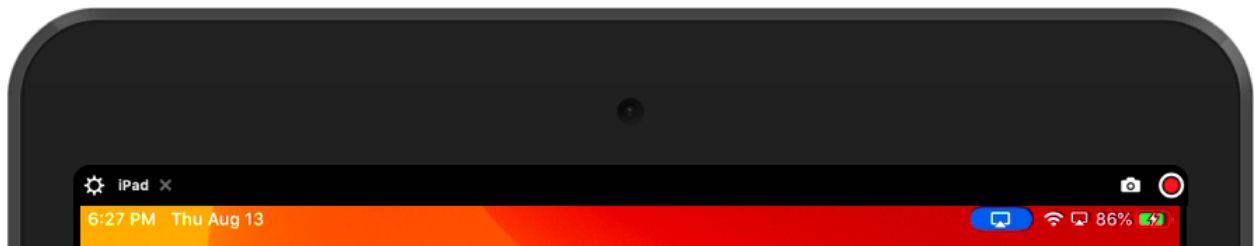
## eSIM and Apple Mobile Devices

Traditionally, cellular devices included a slot where a small Subscriber Identity Module ("SIM") card could be inserted. Most of the time, devices came with a card already installed provided by the carrier that would be providing cell service for the device. Most people never needed to touch it. Some more modern devices are switching to an eSIM, a chip built into the device that serves the same function. The advantage is that an eSIM takes up less space inside the device and it's more flexible since it works with any carrier that supports the standard. It eliminates the need for a new card when setting up service with a new carrier.

The following Apple reference lists the iPad models and countries/carriers that support eSIM: <https://www.apple.com/ipad/cellular/>.

## Activating Cellular Service with eSIM without Jamf

eSIM devices don't know which carrier will be servicing the device when they're first turned on. There are no icons at the top of the screen to indicate cell service has been set up as typically appear when a carrier-specific physical SIM is installed.



If a consumer purchases a device with an included cellular plan, the retailer may configure the eSIM for them. Or they can go into the cellular settings page on the device and pick a plan to purchase for themselves.

The process is different when an organization needs to add an eSIM device to its cellular account. In addition to the Mobile Equipment Identity ("IMEI") number you would normally provide, the carrier will also need the device's eSIM ID Number ("EID"). If you don't already have a list of these, the EID can be found on the outside of the box.



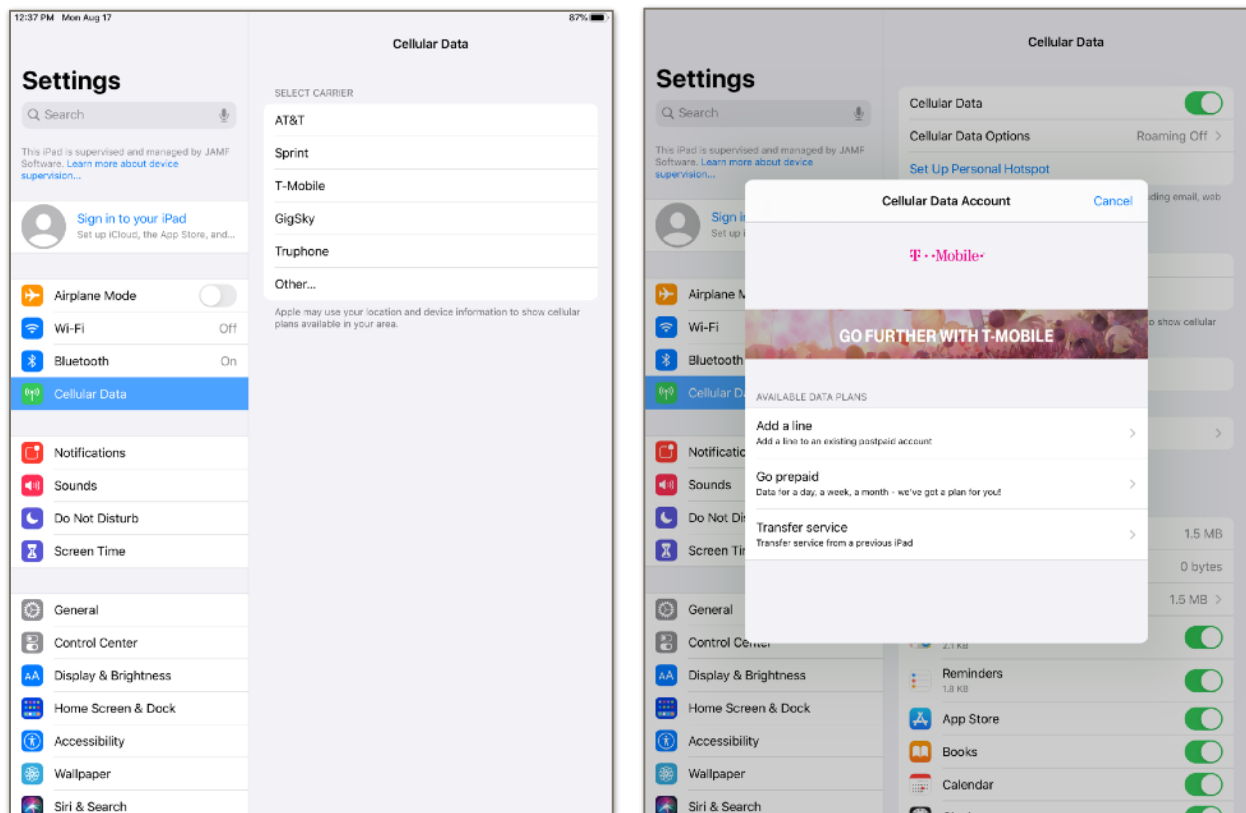
It's also available on the device itself under "Settings > General > About > EID".

If you get a spreadsheet of device serial numbers when they're shipped from Apple and you're working with a carrier Systems Engineer on your project, they may be able to work with their Apple counterparts to get your list of EIDs so they can be enabled for cell service even before you try to activate them.

Your carrier will add your devices to your account and then the service can be activated on the devices. There are a number of manual methods available for setting up cell service with an eSIM -- most carriers have a web page with instructions for the methods they support. They may provide an activation URL/Code that you can enter manually, a QR code to scan, an Apple App Store app, etc.

Apple's <https://support.apple.com/en-us/HT209044> page has detailed information on these activation methods as well as tips for using an eSIM on a dual-SIM phone as might be the case when a corporate device has a separate SIM for personal or international use.

The images below show the Cellular Data pane as it appears on an eSIM iPad that doesn't yet have an activated cellular data plan. The image to the right shows the data plan purchase page for a carrier, in this example, T-Mobile.



# Automated Cellular Activation for iPads

Manual activation in settings.app is practical for consumer devices but too time-consuming if we need to setup large numbers of devices, as might be the case if we're configuring devices for deployment to a population of employees or students. Two Jamf products offer support for automated eSIM activation. Jamf School is purpose-built for management of educational devices. Jamf Pro is often used in other organizations, or by schools with large or complex management requirements.

## Typical Provisioning Workflow

In a common mass-deployment scenario, an organization is going to be distributing iPads to end-users for home use. They often want to configure the devices at a central location or service provider depot to make sure everything is correct before handing out or shipping the device. In education, the student may be young and not an expert troubleshooter. In business, IT may not want employees to have the trouble of shipping a device back to IT if there's something wrong.

Boxes of new devices have been delivered by Apple (or their reseller), cellular service has been purchased, and the cellular carrier has added the EID numbers for the device eSIMs to your organization's data plan account.

To get the devices ready for the users, we'll first need to enroll them devices in a Mobile Device Manager ("MDM") like Jamf Pro or Jamf School. Once that's done, we can do a lot of setup on the devices from a central console without ever having to touch them, including the cellular connection.

There are a few ways to enroll devices in MDM when doing mass-deployment:

**Automated Enrollment** – In this method, Apple School Manager (or Business Manager) already knows your organization owns the devices so they'll tell them to connect to your MDM automatically the first time they're powered on.

**Apple Configurator** – This is a free program available on the Mac App Store. It allow you to connect many iOS or iPadOS devices to a Mac, potentially via a multi-port USB hub and can install the initial software and settings you want and it's fast since it doesn't all need to happen over a WiFi network.

Once the device is enrolled in Jamf Pro or Jamf School, it's easy to install more settings and software, or to push mobile device commands to large numbers of devices, including one to "Reset Cellular Plan". This command tells the devices to connect to your data carrier and active their eSIM so they start getting cellular data. That's a lot easier than setting cell service up on all the devices up by hand.

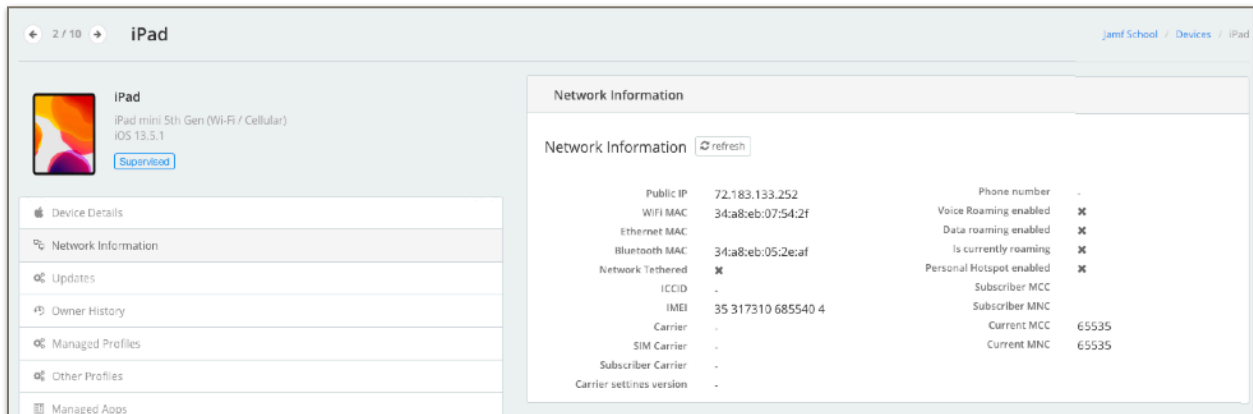
*Some helpful references:*

- [Apple School Manager Guide](#) / [Apple Business Manager Guide](#)
- [Jamf School Deployment Guide](#)
- [Deploying iOS and tvOS Devices Using Apple Configurator 2 and Jamf Pro](#)
- [Enrolling macOS, iOS, and tvOS Devices in Jamf Pro Using Automated MDM Enrollment](#)

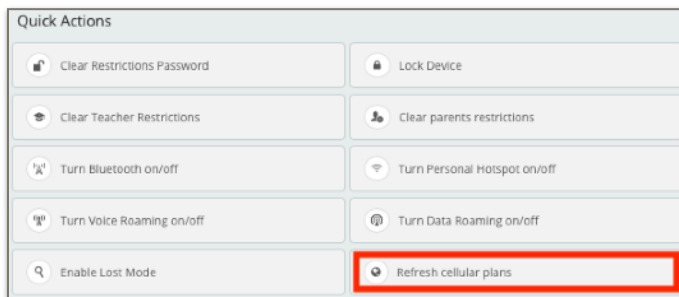
# Activating eSIMs with Jamf School

## Activating a Single Device

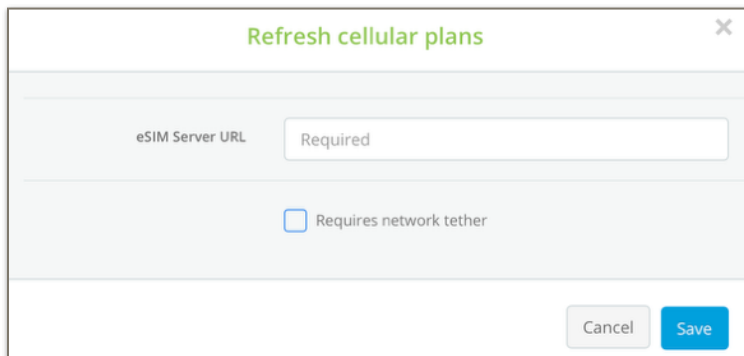
Once a set of devices have been enrolled Jamf School, we can view them under "Devices". If we click on a device to view its details then select "Network Information", we can see that the cellular plan information is blank because cell service hasn't been activated yet.



You can tell the device to contact your cellular carrier and activate its cell service by clicking the "Refresh cellular plans" button under "Quick Actions" in the lower-left of the detail page.



When this button is pressed, a dialog box will appear. Enter the eSim Server URL for your carrier. If you're using network tethering, select the "Requires network tether" checkbox. Ref: [Setting up a shared Internet connection for iPhone and iPad](#).



## Activating Multiple Devices

To quickly activate the cellular data plan on multiple devices, open the device listing and click the checkboxes next to the devices you want to activate. Then select "Refresh Cellular Plans" from the "Advanced" drop-down menu.

The screenshot shows the 'Devices' management interface. At the top, there's a header 'Devices' and a status bar indicating 'With 1 selected:'. Below this are several action buttons: 'Refresh details', 'Move to location', 'Add to group', 'Remove from group', 'More', and 'Advanced'. A dropdown menu is open from the 'Advanced' button, listing various actions. The 'Refresh cellular plans' option is highlighted with a red box. Below the menu is a table of devices. The first device is an 'Apple device van fullname' (Parallels VM). The second device is an 'iPad' (7th generation, Wi-Fi), which has a checkbox selected (indicated by a red box). The third device is another 'iPad' (5th generation, Wi-Fi). The table columns are: Name, Owner, Connected, and Location.

	Name	Owner	Connected	Location
<input type="checkbox"/>	Apple device van fullname Parallels VM	Do not change	5 months ago	Jamf S
<input checked="" type="checkbox"/>	iPad iPad (7th generation, Wi-Fi)	Do not change	7 days ago	Jamf S
<input type="checkbox"/>	iPad iPad (5th generation, Wi-Fi)	Do not change	5 months ago	Jamf S

As with activations from the detail page for a single device, Jamf School will prompt you for your carrier's "eSIM Server URL". This will be provided by your carrier, or see the Notes section at the end of this document for examples for some common carriers.

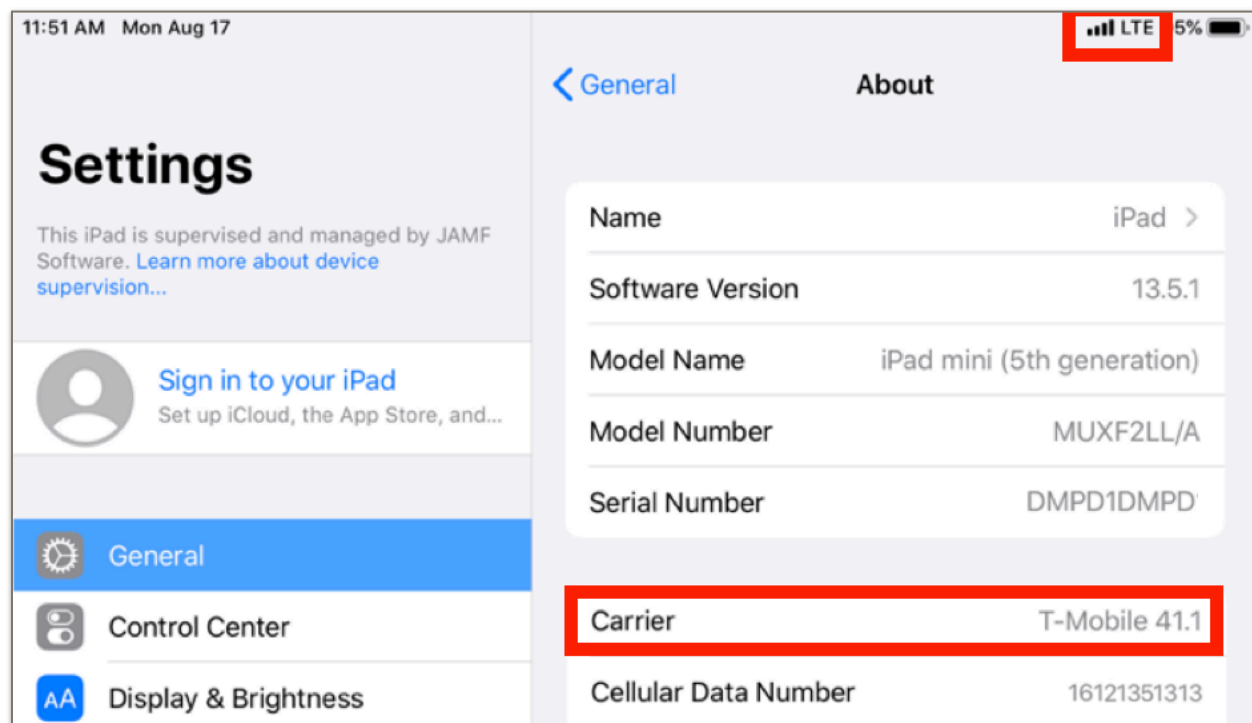
When this button is pressed, a dialog box will appear. Enter the eSim Server URL for your carrier. If you're using network tethering, select the "Requires network tether" checkbox. Ref: [Setting up a shared Internet connection for iPhone and iPad](#).

The dialog box is titled 'Refresh cellular plans'. It contains a text input field for 'eSIM Server URL' with a 'Required' label. Below this is a checkbox labeled 'Requires network tether'. At the bottom right are 'Cancel' and 'Save' buttons.

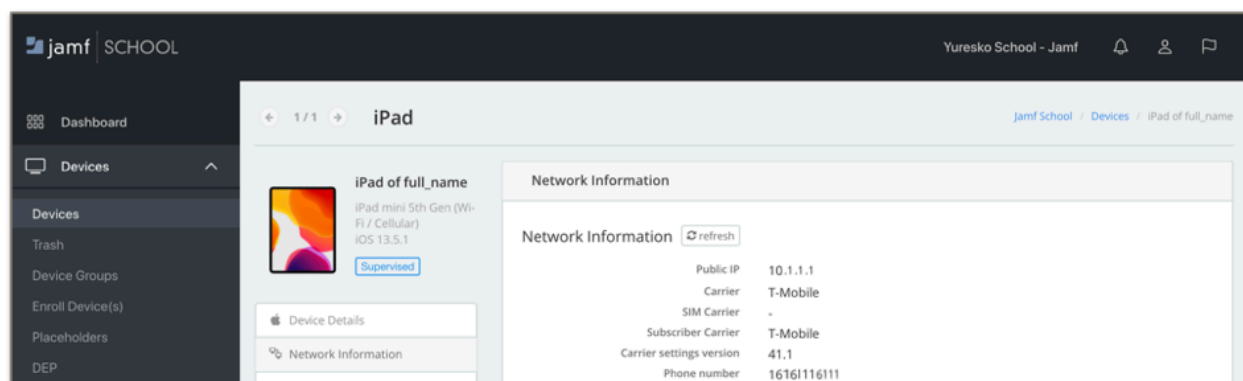
Click the "Save" button once you've filled in the information. Jamf school will send an MDM command to each of the selected devices. This command will direct the Apple OS to contact the carrier's activation server and supply its eSIM ID number. The carrier will match this to your account and reply to the device

with its activation information. The device will then connect to the cellular network without requiring any manual steps on the device.

There are a number of indications that the eSIM has been configured. On the iPad itself, the presence of cell service is indicated by the LTE and signal strength indicator at the top of the screen, and the cell carrier and details of your configuration are shown in Settings.app.



Much of the same data is also now available in the Network section of the device details page in Jamf School.



You can test out the cellular connection by turning off wifi on the iPad (if it's connected) and then opening a web page in Safari.



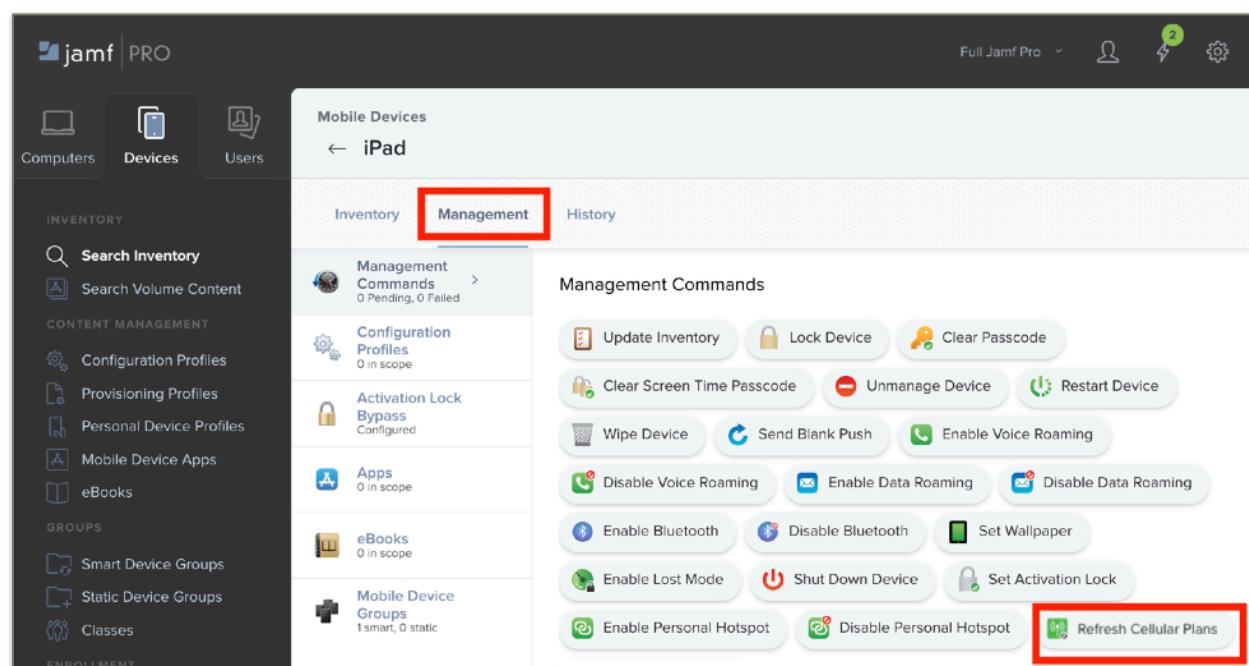
# Activating eSIM Cellular Service with Jamf Pro

When a brand-new device is enrolled in Jamf Pro, we can open its inventory details ("Devices > Search Inventory" > click on the device item in the list > Network section) and see that it's a cellular device because it has values in for things like the IMEI number. Because the eSIM on this device hasn't been activated yet, the Carrier Network fields say, "iPad".

The screenshot displays the Jamf Pro interface for a specific device, an iPad. The left sidebar contains navigation menus for 'Computers', 'Devices', and 'Users', along with sections for 'INVENTORY', 'CONTENT MANAGEMENT', 'GROUPS', 'ENROLLMENT', and 'SETTINGS'. The main content area is titled 'Mobile Devices' and shows the 'iPad' details. The 'Network' section is selected, displaying various carrier and device information. Two fields are highlighted with red boxes: 'Current Carrier Network: iPad' and 'IMEI: 35 317'.

Category	Value
Home Carrier Network	iPad
Current Carrier Network	iPad
Carrier Settings Version	41.0
Cellular Technology	GSM
Phone Number	
IMEI	35 317
MEID	
ICCID	8901 3i
Current Mobile Country Code	65535
Current Mobile Network Code	65535
Home Mobile Country Code	310
Home Mobile Network Code	380
Voice Roaming Enabled	No
Data Roaming Enabled	No
Roaming Enabled	No
Personal Hotspot Enabled	No

The cellular fields will be blank for devices that don't have cellular capability. If we want to activate the cellular data services on this device, switch to the "Management" tab and click the "Refresh Cellular Plans" button.



You'll be prompted for the "eSIM Server URL". Your carrier will supply this to you. A few of them are listed in the Notes section at the end of this document.

### Refresh Cellular Plans

**ESIM Server URL** The carrier's eSIM server URL to query

[Required]

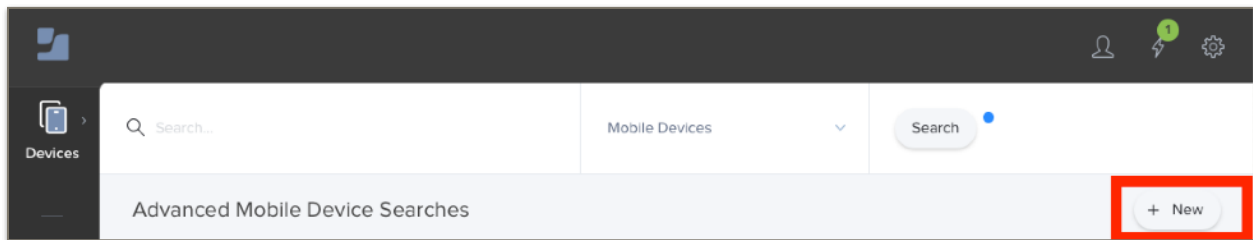
CancelRefresh Cellular Plans

Upon completion, the device will be activated and show cellular bars in the upper corner of the home screen. You can view details about the cell service in "Settings.app > General" on the device and you'll see the carrier information filled in on the device's network inventory details page in Jamf Pro. If you don't, refresh the device's inventory information using the button in the Management tab.

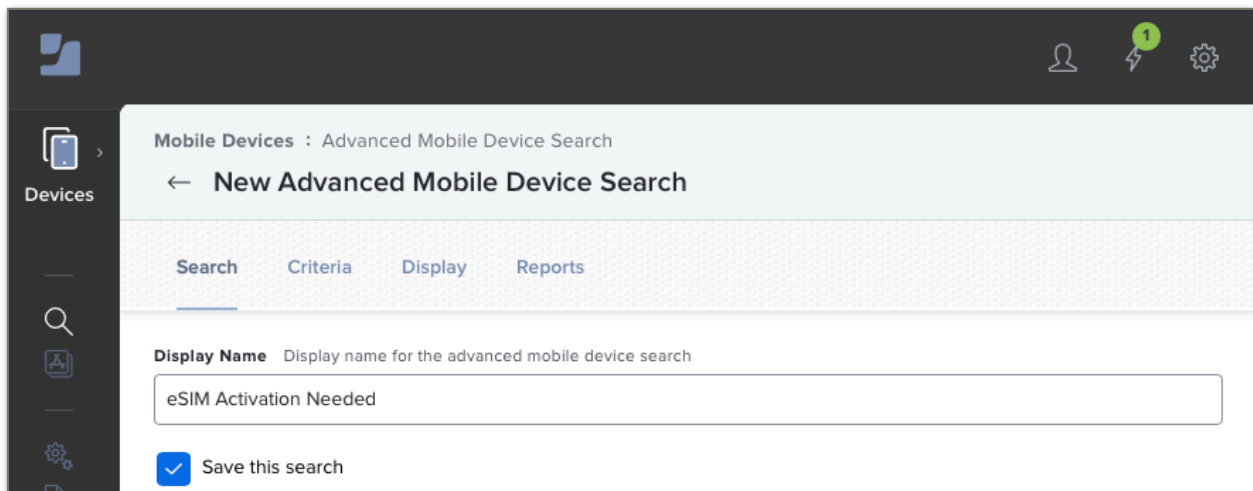
### Listing the Devices that Need to have their Cell Service Activated

Suppose we spent a morning enrolling a large group of new iPads into Jamf Pro using either the Apple Automated Enrollment or Configurator methods and we want them to activate their cell service while we go to lunch. We can create a group of the devices to be activated and then tell Jamf Pro we want them to be setup for cell service all at once. It's a lot faster than clicking into each one individually and hitting the refresh cellular plans button in the management tab.

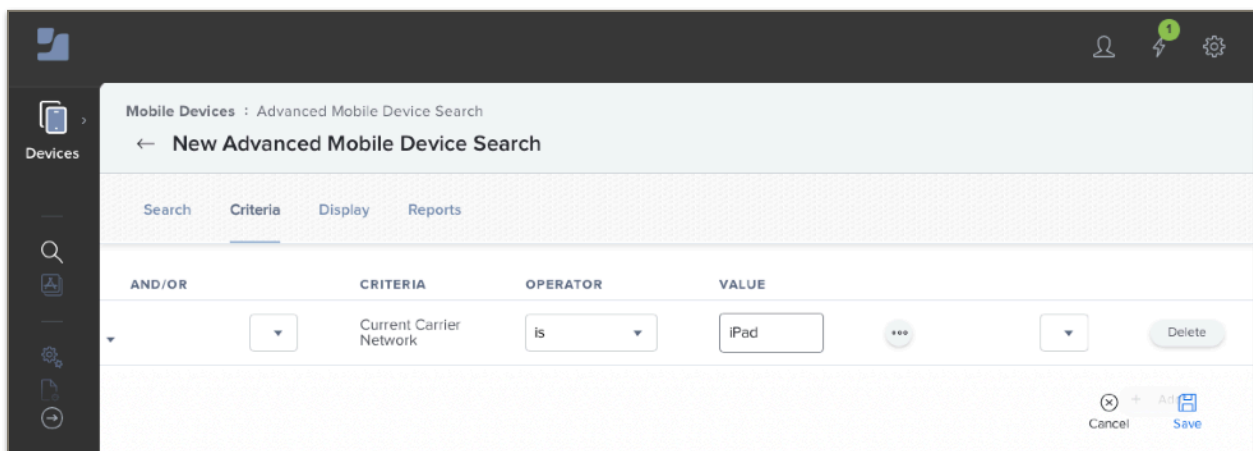
To begin, go to "Devices" and click the "+New" button for Advanced Mobile Device Searches.



If you're going to be doing some additional batches of device enrollments later, you can save the search for later re-use by clicking the "Save this search" checkbox and supplying a name.



Next we'll fill in the "criteria" tab. When we looked at the network inventory details for an iPad that had been enrolled with Jamf Pro but had not yet been configured for cell service, we noted that that the "Current Network Carrier" field was set to "iPad". We can use this behavior to quickly create a set of all devices that need to be setup with their cell service plan.



Once a device is activated with a carrier and inventory information has been updated, that field will change to the carrier's name and the devices will automatically drop out of the advanced search results.

## Advanced Mobile Device Searches

In the preceding section, we created a simple advanced search to create a list of all iPads that still need to be activated. That would cover the majority of deployment scenarios, but there might be some more complicated cases. Jamf Pro has options to cover almost anything.

For example, if you're working over the course of a few days to set up lots of different iPads and only wanted to active a batch of "iPad Pros 11-inch (2nd generation)" that you enrolled today, your criteria might be:

AND/OR	CRITERIA	OPERATOR	VALUE	
	Model	is	iPad Pro 11-inch (2nd)	...
and	Last Enrollment	less than x days ago	1	

This strategy is helpful because there may be cases where a device have activated its cell service but has not yet reported an updated inventory to Jamf Pro. In this case, just filtering for carrier = "iPad" could capture devices that already have their cell service running. In the above example, we're filtering on date and if this is the first time we've pushed out a cell plan reset commands, we'll know we're only updating the devices that are ready for it.

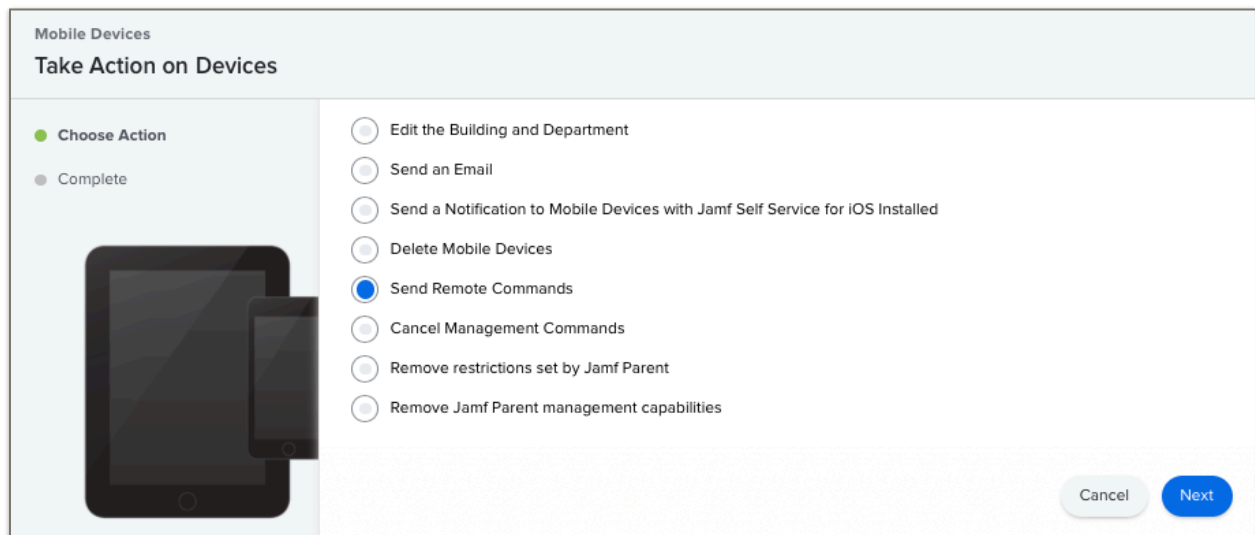
Suppose there are a few iPads that will only be used in the office and you don't intend to activate their cellular data plan. We could add a few "is not equal to" lines to exclude them by name, user, or serial number. If there were many such devices, we could create a "No Cell Service Needed" static group and add an "is not a member of" line to our advanced search to exclude them.

What if we're deploying lots of different models and the setup work is happening at many different sites? That might be the case with a large education deployment with staff at each of a district's schools setting devices up at the same time. We could create a separate "Activation Needed" advanced search for each location and filter on external IP address (if every school had a different one). If we are including a school abbreviation somewhere in the device names that we're applying with Apple Configurator, we could add a "Device name/contains/<school code>" line.

If you're doing a 1:1 deployment and assigning the devices to specific users, you can even use information like department of group membership from a directory service like Active Directory.

## Bulk Cell Plan Activation in Jamf Pro

Once you have your Advanced Search criteria the way you want, click the "Save" button and then the "View" button at the bottom of the page to show the list of all the devices that meet your "Activation Needed" criteria. From the device listing screen, click the "Actions" button. Jamf Pro will display a list of things you can do to a group of devices. Select "Send Remote Commands" and click the "Next" button.



Mobile Devices

Take Action on Devices

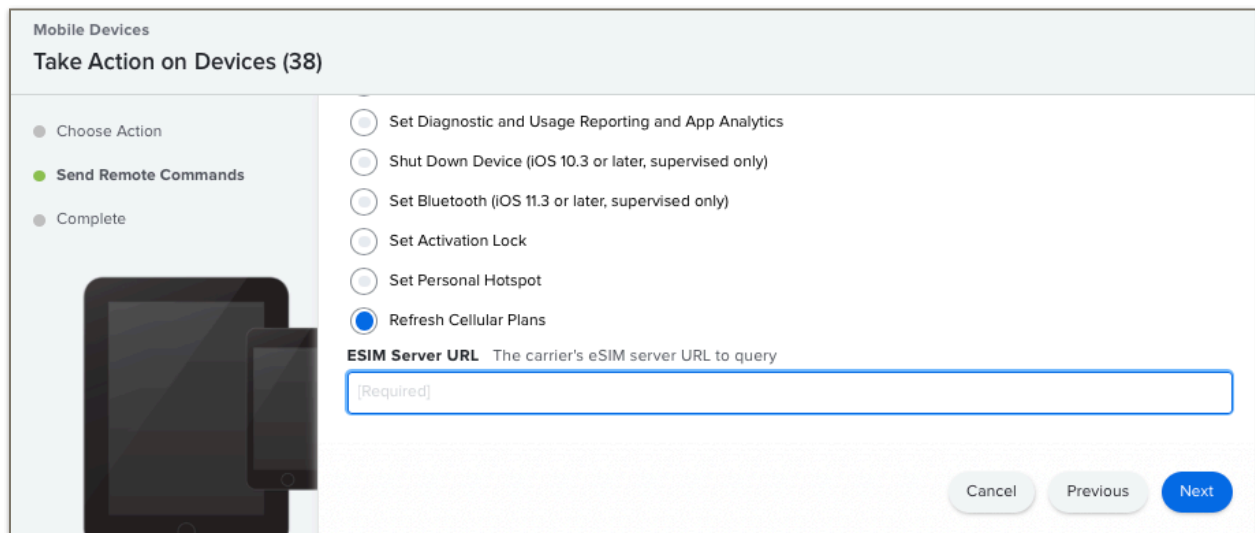
● Choose Action

● Complete

- ☐ Edit the Building and Department
- ☐ Send an Email
- ☐ Send a Notification to Mobile Devices with Jamf Self Service for iOS Installed
- ☐ Delete Mobile Devices
- ☒ Send Remote Commands
- ☐ Cancel Management Commands
- ☐ Remove restrictions set by Jamf Parent
- ☐ Remove Jamf Parent management capabilities

Cancel Next

Select "Refresh Cellular Plan" and enter the activation URL provided by your carrier. (See the notes section at the end of this document for some common carriers.) Then click "Next".



Mobile Devices

Take Action on Devices (38)

● Choose Action

● Send Remote Commands

● Complete

- ☐ Set Diagnostic and Usage Reporting and App Analytics
- ☐ Shut Down Device (iOS 10.3 or later, supervised only)
- ☐ Set Bluetooth (iOS 11.3 or later, supervised only)
- ☐ Set Activation Lock
- ☐ Set Personal Hotspot
- ☒ Refresh Cellular Plans

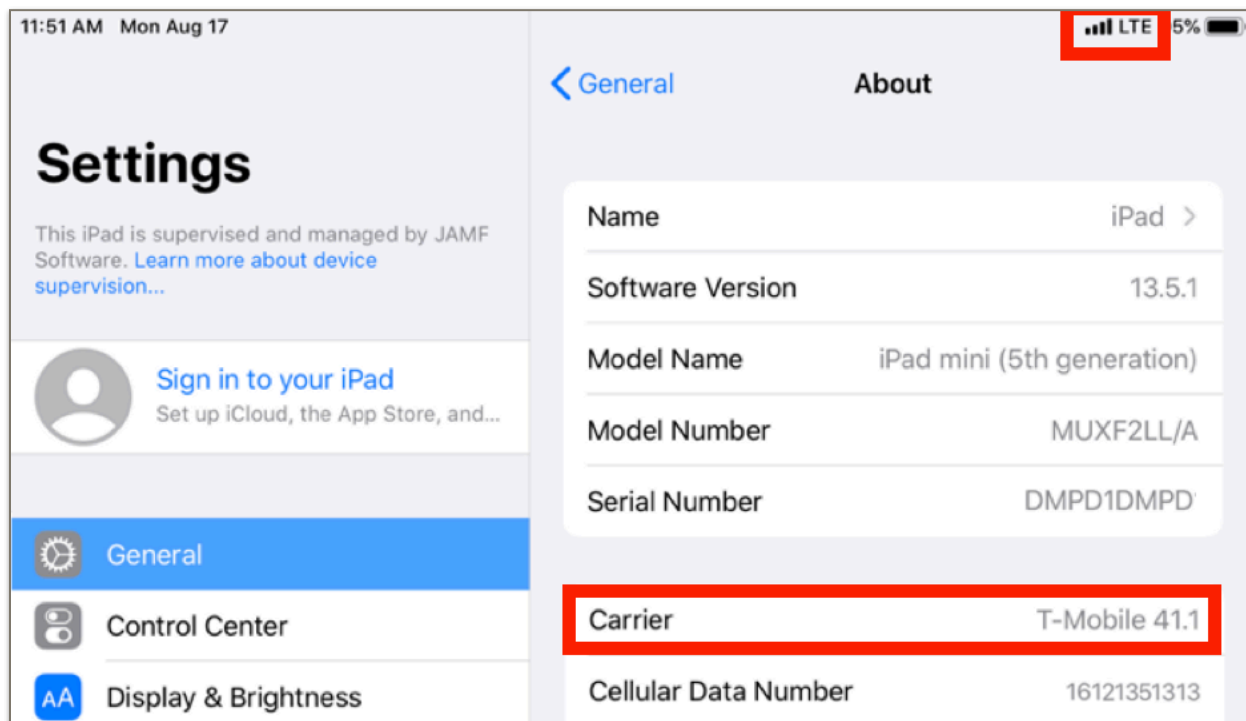
**ESIM Server URL** The carrier's eSIM server URL to query

[Required]

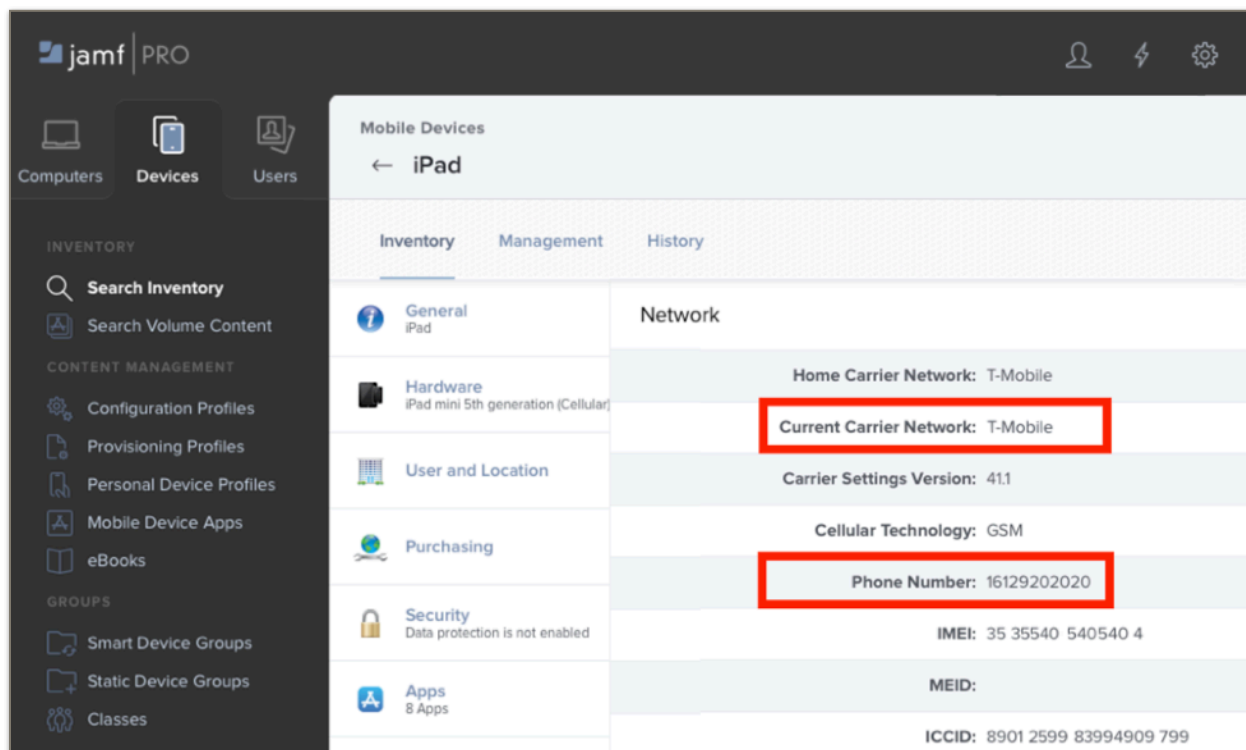
Cancel Previous Next

Jamf Pro will send the command to each device in the device list. The devices will contact the carrier activation server you specified and retrieve their cell plan settings. They'll connect to the cellular network without requiring any manual steps on the device.

When checking the iPads, we'll see the cell service signal strength in the upper-right corner of the screen and the carrier will be listed if we go into Settings > About on the iPad.



Once the device has submitted its next inventory, the details for the cell service will appear in Jamf Pro's device details page, including Carrier and Phone Number information.



# eSIM Implications for Device Reset

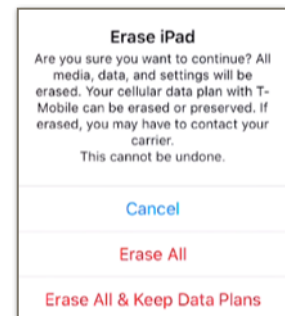
## Device Reset and "Retain Cellular Plan" in iPadOS

Carriers remove device information from their activation servers once an eSIM has been activated. For this reason we need to be careful to retain the cell plan on the device if we ever need to reset content and settings, as might be the case if we're transferring it to a new user. Otherwise, the cell activation will be removed and you may not be able to reapply it without contacting your carrier for assistance.

If you unintentionally remove the cellular settings on a previously activated eSIM device, it's unlikely that resending the "Reset cellular plan" MDM command will work. If you do so, you will probably see a popup message on the iPad stating, "Cellular Plan Cannot Be Added; This code is no longer valid. Contact your carrier for more information" You'll need to contact your carrier and give them the device's IMEI and EID numbers so they can re-enable the device in their activation servers. Once that's done, they may instruct you to restart the device. Then you should be able to re-activate the device's cellular service.

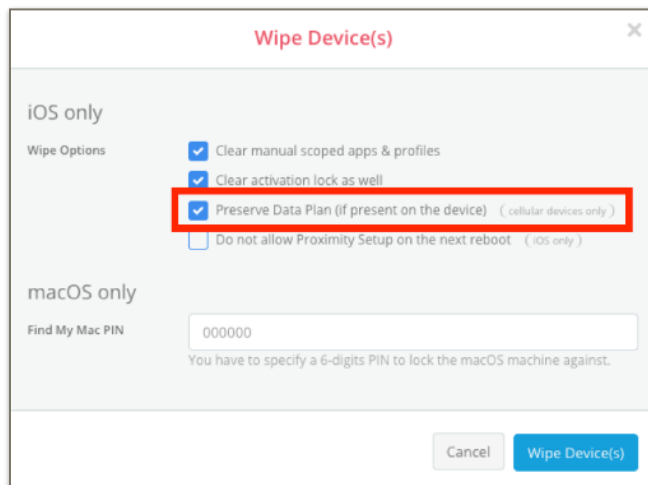
## Removing Content and settings from an eSIM device

If you tap "Erase all contents and settings" in "Settings.app > General > Reset" on a dual SIM/eSIM device, iPadOS will give you two options. If you're going to be giving the device to a new user but it will be on the same cellular plan, select the "Erase All & Keep Cellular Plans" option. If you're going to be disposing of the device, transferring ownership, or switching to a new cellular account, select the "Erase All" option.




## Sending the Device Wipe command to an eSIM device in Jamf School

To send a remote wipe command to a device (or to a series of devices) in Jamf School, check its box in the device listing and select Wipe Devices from the Actions menu. In the resulting options menu, be sure to select "Preserve Data Plan" if you want the device to remain on your account.



### Sending the Device Wipe command to an eSIM device in Jamf Pro

If you're using Jamf Pro to wipe a device with a remote action, be sure to check the "Retain Cellular Data Plan" option unless you no longer want the device to have cell service with your carrier. This command can be sent to an individual device from the Management tab in its inventory detail page or as a mass-action to a group of devices in an Advanced Search or Mobile Device Group.

 **Wipe Device**

☐

 Clear Activation Lock (supervised iOS devices only)

☒

 Retain Cellular Data Plan

☐

 Suppress Proximity Setup

Cancel

Wipe Device



# Cellular-related Popup Notifications

The following message may be seen in iPadOS.

## **“Carrier Settings Update”**

Carriers may occasionally ask Apple to add some cellular radio and network settings to cellular-capable devices after they've been purchased. You might see a prompt informing you that such an update is available when you're activating your iPads. Select the “Update” option if you see this prompt.

Ref: <https://support.apple.com/en-us/HT201270>

## **“Cellular Plan is Ready to be Installed”**

Once your carrier has entered the IMEI and EIDs for your devices into their activation system, you might see a prompt on an iPad saying that it's ready to set up cellular data. You can activate the cellular plan on these devices if you're doing manual setups. But if you're configuring lots of devices and don't want to tap the activation by hand on every one of them, disregard this message and instead use the “Refreshing Cellular Plan” mass-action command in Jamf School or Jamf Pro.

## **“No SIM Card Installed”**

It's OK if you see this message on an eSIM device. It just means that in addition to the eSIM, there's also a slot for a physical SIM card and it's empty. You can see that the device has cellular service via the eSIM in "Settings->General->About" or by looking for the vertical signal-strength bars at the top of the home screen once the eSIM has been activated.

## **“Unable to Complete Cellular Plan Change”**

This occurs when the MDM has sent the Refresh Cellular Plans to a device that is already activated. It won't hurt anything on the device if you accidentally send the command, but you should avoid doing so if a user already has the device so they aren't confused by the message.

## **“Cellular Plan Cannot Be Added; This code is no longer valid.”**

This happens if you send a "Reset cellular plan" MDM command after removing the cellular settings on a previously activated eSIM device. The device's information is no longer active in the carrier's automated activation systems. You'll need to contact your carrier and give them the device's IMEI and EID numbers so they can re-enable the device in their activation servers. Once that's done, they may instruct you to restart the device. Then you should be able to re-activate the device's cellular service.

# Troubleshooting

## Cell Service is not activating after sending the Refresh Cellular Plan command

1. Ensure the device IMEI and EID numbers have been sent to carrier for activation
2. Ensure device is on
3. Ensure the device is on Wifi or has a tethered data connection so that it can communicate with Jamf, Apple, and your cell carrier.
4. Perform the activation in a location where cellular service is available from your carrier.
5. Verify that there aren't any backlogged/pending MDM commands, macOS updates, or app installs. Sending a fresh inventory command to the device may update Jamf Pro on the status of the device if it is outdated.

*Example:* A school sent the refresh cellular command to 100 devices that had been enrolled via Automated Enrollment. It took an hour for the devices to show up as activated for cell service. In this case, their network admin noticed that their wifi as well as the school's connection to the Internet was saturated. The devices were downloading and installing the many apps that the admin had scoped to the devices so they were competing for bandwidth. It's best to wait until data-intensive activities are completed before sending the reset cellular plan command and perhaps we shouldn't try to activate 1,000 devices all at once on your first try. Do a few to start and then start increasing the numbers as you are observing success. Consider the use of Apple Caching Service to reduce the network demand required for Apple OS updates and the installation and updates of your apps and content.

# Notes

## Carrier eSIM Activation Server URLs ("SM-DP+" Servers) for use with "Reset Cellular Plan"

Carrier	URL
Verizon	<a href="https://2.vzw.otgeuicc.com">https://2.vzw.otgeuicc.com</a>
AT&T	<a href="https://cust-001-v4-prod-atl2.gdsb.net">https://cust-001-v4-prod-atl2.gdsb.net</a>
T-Mobile	<a href="https://t-mobile.gdsb.net">https://t-mobile.gdsb.net</a>

Don't include a trailing "/" on the URL.

### Activation attempts on non-eSIM devices

If you inadvertently include a non-eSIM devices in a selection of devices to receive the reset cellular plan mass-action, Jamf Pro will ignore the request as it knows the device is not capable. The non-eSIM device will remain unaffected.