Getting started with Azure Stack for CSPs

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# Summary

This document describes how CSPs can get started with setting up their Azure Stack to onboard and manage end customers. It provides a quick overview about CSP billing along with references to API and PowerShell scripts which can be used to automate some of these process steps.

# Planning your work

To be successful running Azure Stack as a CSP, you will need to take some steps to plan how you want to offer services and configure Azure Stack for your needs. The major areas to plan for are:

* How you want to [bill your end customers](#_Azure_Stack_billing). In this phase, you will decide how to register your Azure Stack and plan the integration with your billing system.
* [What services you want to offer](#_Quota,_Plans_and) to which customers. This will determine how you configure quotas, plans, and offers on your system.
* How you will [onboard new customers and users](#_End_user_onboarding) to your system. This may be a manual process that you perform for each new user, or it may be an highly automated process that you integrate with your public portal.

Some understanding of the Azure Stack CSP program and of the Partner Center portal will be very useful. This paper assumes this knowledge. You will find a lot of training materials in [Partner Center](https://partner.microsoft.com/en-us/cloud-solution-provider/csp-partner).

# Azure Stack billing overview

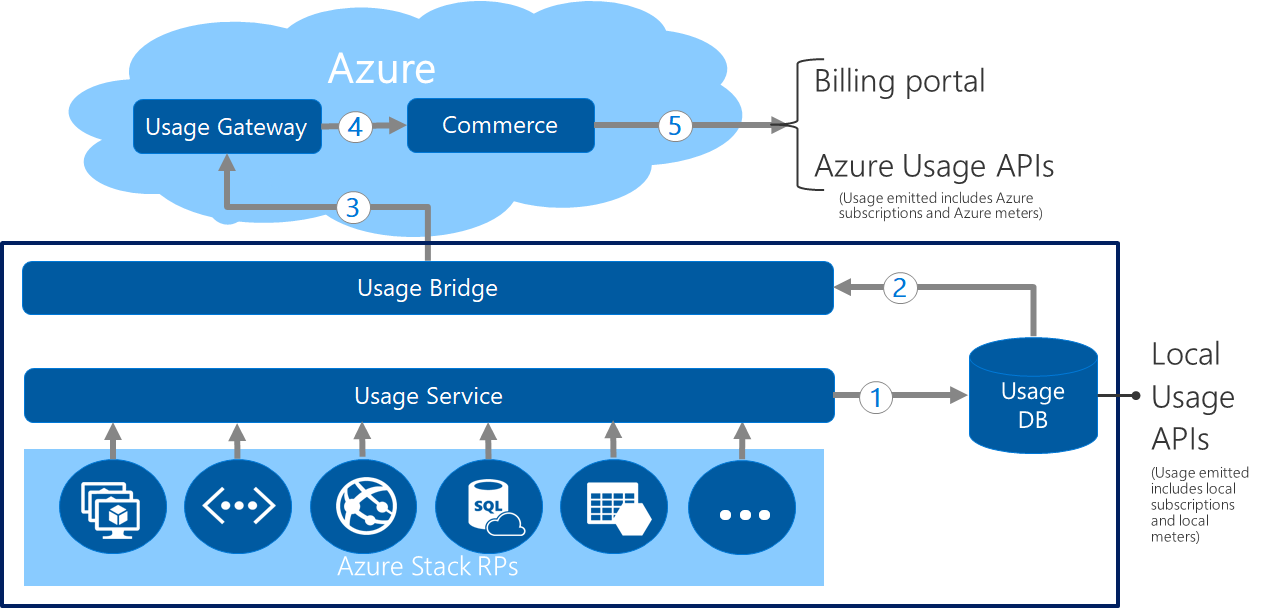
Microsoft sells Azure Stack on a pay-per-use basis. There is no charge to deploy Azure Stack; instead, charges accrue in proportion to actual usage, only when Azure Stack is used. The services that Microsoft charges for include virtual machines (VMs), storage, and PaaS services such as AppService.

## Usage reporting infrastructure

Azure Stack includes the infrastructure needed to track usage as it occurs and forward it to Azure, where Azure Commerce processes it and charges it against Azure subscriptions, in the same way as usage that takes place in the public Azure cloud.

You should be aware that certain concepts are consistent between Azure and Azure Stack, but the instances are specific to each cloud, for example:

* Azure Stack has local subscriptions, which fulfill a similar role to Azure subscription, but are only valid locally. Local subscriptions are mapped to Azure subscriptions when usage is forwarded to Azure.
* Azure Stack has local usage meters; local usage is mapped to the meters used in Azure commerce, but the meter IDs may be different, and there are more meters available locally than the one Microsoft uses for billing.
* There are some differences between how services are priced in Azure Stack and Azure. For example, in Azure Stack, VMs are charged only based on vcore/hours, with the same rate for all VM series, unlike Azure (the reason is that in Azure the different prices reflect different hardware; in Azure Stack, the customer procures the hardware, so there is no reason to charge different rates for different VM classes).

*Figure: Basic components of Azure Stack usage pipeline*

Azure Stack operator can query the local usage API to pull usage data for all user subscriptions by using subscriber usage aggregates API which is documented [here](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-provider-resource-api). You can pull usage data reported to Azure Commerce by using the [Partner Center usage API](https://docs.microsoft.com/en-us/partner-center/develop/get-a-customer-s-utilization-record-for-azure). This is the same usage API that you query to pull Azure usage data.

You can find out about the Azure Stack meters used in Commerce and their prices in Partner Center, in the same way as you would do for Azure services:

* Sign in to [Partner Center](https://partnercenter.microsoft.com)
* Under Dashboard, click on Pricing and offers
* Under Usage-based services, click on the entry marked “Current”
* Open the “Azure in Global CSP price list” spreadsheet
* Filter on Region = Azure Stack.

# Registration

As soon as the deployment of an Azure Stack is completed, you need to configure usage reporting and associate the Azure Stack with an Azure subscription, to which usage will be charged. This process is called **registration.** Once your Azure Stack is registered, Azure Stack usage data is forwarded to Azure Commerce and billed against Azure subscription used during registration.

You will need an Azure subscription to begin the registration process. The types of subscriptions that can be used for registration are:

* CSP
* Partner Shared Services subscription (CSPSS)
* Enterprise Agreement (EA)

Because we focus on CSP scenarios in this paper, we will talk about CSP and CSPSS subscriptions here.

### CSP Shared Services

CSPSS subscriptions are the preferred choice for registration when a Direct CSP or a CSP Distributor operates the Azure Stack.

Please refer to this page for a description of CSPSS subscriptions, and how to create one: <https://msdn.microsoft.com/en-us/partner-center/shared-services> .

An important point: CSPSS subscriptions are associated with a shared services tenant. When you register Azure Stack, you need to provide credentials for an account that is an owner of the subscription. The account you use to register Azure Stack can be different from the administrator account that you use for deployment; the two do NOT need to belong to the same domain. In other words, it is perfectly OK to deploy using the tenant you normally use, for example ContosoCSP.onmicrosoft.com, then register using a different tenant, for example IURContosoCSP.onmicrosoft.com. You will of course need to remember that you log in using ContosoCSP.onmicrosoft.com when you do day-to-do Azure Stack administration, and you log in to Azure using IURContosoCSP.onmicrosoft.com when you need to do registration operations

### CSP subscriptions

CSP subscriptions are the preferred choice for registration when a CSP Reseller or an end customer operates the Azure Stack.

Follow this [document](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-registration) to register your Azure Stack. Make a note of the name of the registration name, as it will be needed for subsequent updates. For multi-node integrated systems, registration will usually be carried out by the OEM service personnel. The registration script is available on [GitHub](https://github.com/Azure/AzureStack-Tools/tree/master/Registration). **Note**: each registration is specific to one Azure Stack deployment. If you deploy more than one Azure Stack, each needs to be registered. End customers need to be registered with each Azure Stack they use.

# Quota, Plans and Offers

Once your Azure Stack has been registered, you need to configure quotas, plans and offers to deliver Azure Stack services to end users. Here is a quick overview of these concepts:

1. Quotas: Quotas determine the amount of resources a user can consume of a particular service. You need to create quotas for individual services offered on Azure Stack.
2. Plans: Plans allow you to group services and their quotas together. An offer must have a base plan which includes services that are offered by default to the users. Optionally, you can add add-on plans to an offer that users can subscribe to get access to additional services or increased quotas.
3. Offers: Offers allows you to group plans to define what resources and upper resource limits a user can consume. User subscriptions are created using offers which allows customers to create Azure Stack resources. You can set offer states to private or public. Private offers are only visible to administrators and they need to explicitly grant users access to these offers. Public offers are visible to all users and anyone from directory tenant onboarded to Azure Stack can subscribe to it.

There are some design considerations you need to evaluate when designing offers, plans and quotas:

1. You may choose to create a pre-defined list of offers and assign all customers to the pre-defined set or you can create custom offers per customer. This decision depends on whether your customers would need customized services and how many offers you can manage.
2. You should think about which services you would like to offer by default to all customers and which services would you like to offer as add-ons services. This defines how you would build base vs. add-on plans.
3. You should think about how involved you want to be in the user onboarding process. If you want users from an approved AAD tenant to be able to sign up for offers without your approval, you must make your offers public. Keep in mind, Azure Stack has limited capacity!

You can find more details about offers, plans and quotas [here](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-plan-offer-quota-overview) along with instructions to set them up using the admin portal.

### API Reference

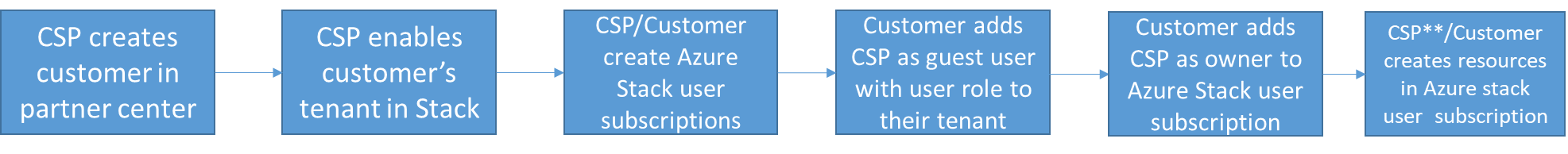
You can automate the creation and updates of these artifacts using the following APIs:

* [Offers](https://docs.microsoft.com/en-us/rest/api/azurestack/offers)
* [Plans](https://docs.microsoft.com/en-us/rest/api/azurestack/plans)
* Quotas for basic services:
  + [Compute](https://docs.microsoft.com/en-us/rest/api/azurestack/quotas%20(compute))
  + [Storage](https://docs.microsoft.com/en-us/rest/api/azurestack/storagequotas)
  + [Network](https://docs.microsoft.com/en-us/rest/api/azurestack/quotas%20(network))

# End user onboarding

Once you have configured offers, plans and quotas, you are ready to onboard end customers to your Azure Stack instance. The following section explains the steps to onboard a new customer to Azure stack. This process starts with setting up the customer in Azure and then performing few additional steps to enable the new customer in Azure Stack.

We will assume that registration has already been completed, as discussed in the previous section.



## Setup Customer Accounts in Partner Center

CSP partner needs to first onboard the customer in Partner Center which is explained [here](https://docs.microsoft.com/en-us/partner-center/add-a-new-customer). If your customer already has an AAD tenant, you can request to create a reseller relationship using the instructions in this ￼. Once the customer is onboarded to Partner Center, CSP partner needs to create customer’s Azure subscription as explained [here](https://docs.microsoft.com/en-us/partner-center/create-a-new-subscription). If you are a CSP reseller, contact your CSP partner to setup customer account and subscription in Partner Center.

*Note: When a partner creates a customer subscription in Partner Center, they get added as an owner on the Azure subscription automatically. In fact, customers don’t have access to their subscriptions unless the partner grants them access to it. This behavior is not replicated in Azure Stack and will be explained further towards the end of this section.*

### API Reference

In order to automate the customer creation and management process in Partner Center, you can use APIs explained [here](https://docs.microsoft.com/en-us/partner-center/develop/manage-customers). Furthermore, you can automate creation of Azure subscription using API explained [here](https://docs.microsoft.com/en-us/partner-center/develop/purchase-azure-reservations). There are other operations supported through APIs to manage subscriptions that are listed [here](https://docs.microsoft.com/en-us/partner-center/develop/place-orders).

## Onboard Customer’s Tenant on Azure Stack

Next, Azure Stack operator must onboard the customer’s tenant to Azure Stack. This step is broken into two sub steps:

* 1. You must configure the Azure Stack for multitenancy, and onboard the new customer’s AAD tenant to Azure Stack. This process ensures that Azure Stack can allow users from the new AAD tenant to create resources and use Azure Stack services. [This article](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-enable-multitenancy) has detailed instructions including PowerShell scripts that you can use to onboard a new AAD tenant to Azure Stack.
  2. Optionally, you can also report usage of all users from the new customer tenant against the customer’s CSP Azure subscription on Partner Center. This will ensure usage is reported against the correct customer in Partner Center and make it easier for you to bill your customers. This process is explained in detail under the [Registering tenants](#_Registering_tenants) section below.

## Setup Azure Stack user subscriptions

Azure Stack operator can now create local Azure Stack subscriptions for the end customer, who is then ready to start using Azure Stack. Azure Stack operator can create a user subscription using the admin portal by subscribing the user to an offer explained in the [previous section](#_Quota,_Plans_and). This [online article](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-subscribe-plan-provision-vm#create-a-subscription-as-a-cloud-operator) explains how an operator can setup Azure Stack subscription. You can also allow customers to create their own subscription by keeping your offer public.

### API Reference

You can automate the creation of Azure Stack user subscriptions using APIs documented [here](https://docs.microsoft.com/en-us/rest/api/azurestack/subscriptions/get).

## Admin On Behalf Of

The customer may want their CSP partner or reseller to manage Azure Stack resources on their behalf. The customer can grant RBAC rights to CSP partner or reseller to manage their Azure Stack subscription using the following two steps:

1. Customer must add CSP partner or reseller as guest user to their tenant directory. *Note: CSP partner should create a new user in their tenant directory and the customer should invite this new account as guest user in their directory tenant instead of their partner center account to avoid any conflicts with partner center default permissions.*
2. Customer must add CSP as owner or contributor to Azure Stack user subscription.

# Reseller model

As an Azure Stack operator, you may choose to work with resellers who oversee managing end customers on your behalf. To support this scenario, you can onboard resellers as **delegated provider** which allows them to create offers and sign up customers to these offers. This [article](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-delegated-provider) explains the process to setup delegated offer and provider.

Things to note:

1. Azure Stack operator creates the delegated offer and delegated provider can only resell this offer. No changes can be made to the offer created by the operator.
2. There can only be one delegated provider per directory tenant.

# Registering tenants

When an Azure Stack is shared among multiple end customers (multiple AAD tenants from an identity point of view), you can report each customer’s usage against their CSP subscription. Registering tenants ensures that each customer tenant’s usage will be reported and billed against that customer’s CSP subscription. If you do not go through this process, end customer usage will be charged to the subscription used in the initial registration.

For each Azure Stack, there is going to be one default subscription and as many user subscriptions as needed:

* The default subscription is an Azure subscription that is charged if there is no end user-specific subscription. It must be the first to be registered. For multi-tenant usage reporting to work, the subscription must be a CSP or CSPSS subscription.
* Then, the registration is updated with an Azure subscription for each end customer that is going to use the Azure Stack. End customer subscriptions must be of the CSP type and must roll up to the partner who owns the default subscription (in other words, you cannot register someone else’s customers!).

When usage information is forwarded to Azure, a service in Azure consults the registration and maps each Azure Stack subscription’s usage to the customer’s Azure subscription. If an end user has not been registered, that usage goes to the default subscription for the Azure Stack from which it originated.

Since customer subscriptions are CSP subscriptions, their bill is sent to the CSP partner, and usage information is not visible to the end customer.

The first step is to get your registration approved (“tagged”) to use multi-tenancy. To do this, send mail to [AzStCSP@microsoft.com](mailto:AzStCSP@microsoft.com), and include in the mail your registration name, the resource group in which it is stored, and the subscription ID you used in registration. Microsoft will review the registration and the subscription, tag it, and confirm back to you.

The second step is to add tenants to your registration. This [document](https://docs.microsoft.com/en-us/azure/azure-stack/azure-stack-csp-ref-operations) outlines the steps to update registration and add tenants using PowerShell and API call.

# Some real-world scenarios

The CSP program can be applied to a variety of business situations, from service providers operating Azure Stack to hardware providers delivering Azure Stack hardware and software in one single contract. This section discusses a few cases and how billing works in each of them.

## 1. Direct CSP owning and operating Azure Stack

From a business point of view, the Direct CSP is a service provider who operates Azure Stack. The Direct CSP has a billing relationship with Microsoft: all the usage of the Azure Stack is billed to the Direct CSP, who in turn bills the end customers. The details of usage by end customer are provided in the Reconciliation file.

In this scenario, the recommended approach is (Figure 2):

Figure 1. In this scenario, the Direct CSP operates Azure Stack and provides services to End Customers.

1. Obtain a CSPSS subscription.
2. Register Azure Stack using the CSPSS subscription.
3. Update the registration for each end customer (tenant) who will use Azure Stack.
4. Usage will be billed against each tenant’s subscription.

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Figure 2. A schematic view of the AAD tenants and subscriptions required for Azure Stack billing when a Direct CSP Partner owns and operates Azure Stack. AAD tenants are in green, Azure subscriptions in orange.

## 2. CSP Distributor Operates Azure Stack

This scenario is concerned with the Indirect CSP model (also known as 2-tier CSP). In this scenario, the Indirect Provider (or Distributor) operates Azure Stack. A network of resellers helps the CSP reach end customers and sell the Azure Stack services to them; the resellers could also provide technical services to the end customers.

Figure 3. In this scenario, the Indirect CSP Partner owns and operates Azure Stack, and resells capacity through resellers. If the reseller operates Azure Stack, see the next scenario.

The Indirect Provider has a billing relationship with Microsoft: the usage of the Azure Stack is billed by Microsoft to the Indirect Provider, who in turn bills either the resellers or the end customers. The reconciliation file identifies which reseller is associated with each end customer, and details usage by end customer.

In this scenario, the recommended approach is:

Figure 4. A schematic view of the AAD tenants and subscriptions required for Azure Stack billing when an IndirectCSP Partner owns and operates Azure Stack. Partner roles are in blue, AAD tenants in green, Azure subscriptions in orange.

1. Obtain a CSPSS subscription.
2. Register Azure Stack using the CSPSS subscription
3. Update the registration for each end customer (tenant) who will use Azure Stack.
4. Usage will be billed against each tenant’s subscription.

## 3. Indirect CSP – Reseller Operates Azure Stack

In this scenario, the Reseller operates Azure Stack, and the Indirect Provider provides billing and other services to the reseller.

The Indirect Provider (Distributor) holds the billing relationship with Microsoft: the usage of the Azure Stack is billed to the Indirect Provider, who in turn bills either the resellers or the end customers directly. The Distributor has control of Partner Center and creates tenants and subscriptions on behalf of resellers and end customers.

The recommended steps in this scenario are:

Figure 5. A schematic view of the AAD tenants and subscriptions required for Azure Stack billing when an Indirect CSP reseller owns and operates Azure Stack. Partner roles are in blue, AAD tenants in green, Azure subscriptions in orange. All tenants and subscriptions are created by the distributor using Partner Center.

1. The Indirect Provider will create an AAD tenant and a CSP subscription in Partner Center for the reseller, and hand over the credentials to the reseller.
2. The reseller will use the tenant and subscription to register Azure Stack.
3. If and when needed, the reseller will also depend on the indirect provider to create AAD tenants and subscriptions for the end customers, as it would do for Azure resale.
4. The reseller updates the registration with mappings for each end customer.
5. Usage will be billed against each tenant’s subscription, and the CSP Distributor will receive the bill and pass it to the reseller.

It is worth noting that, just like in Azure, the reseller will not have direct visibility into usage and charges on their CSP subscription, nor on those of the end customers, through the Azure billing portal. This information needs to be obtained from the indirect provider. Resellers should discuss with their indirect provider how this information will be made available and how frequently.

## 4. Indirect or Direct CSP – End Customer Operates Azure Stack

In this scenario, the Indirect Provider (or Distributor) supplies the Azure Stack to an end customer, possibly via a reseller. The end customer operates the Azure Stack. The Indirect Provider bills the end customer, and some combination of the Indirect Provider and the Reseller provide support.

In this case, there is no multi-tenancy on Azure Stack. The end customer needs a CSP subscription from the CSP partner, then uses it for the initial (default) registration. Usage is billed to the Indirect Provider.