Highly Available

128T Session Smart Router in Public Cloud providers

CONTENTS

OVERVIEW

One of the value propositions of the public cloud, among others, is the opportunity that it provides to businesses to build and deploy more reliable services and applications. The premise relies on the fundamental design principle of approaching cloud design with an intrinsic assumption that "everything can and will fail".

Having this principle in mind, the recommendation is always to design and deploy the network infrastructure in a highly available (HA) fashion from the start. It is highly desirable that in case of a network failure, of any kind, the network infrastructure has been planned to recover quickly, effectively isolating and minimizing the impact to business applications.

Traditional solutions to deploy highly available networking systems do not work in public cloud providers. In most of the well-known public cloud providers the behavior of their underlying network implementation differs when compared to a traditional physical infrastructure. In particular, a traditional highly available solution in networking is often based on the use of virtual mac addresses, which are unknown to the underlying public cloud network infrastructure, resulting in traffic being not allowed and dropped; another industry standard solution is based on multicast which is not supported by any of the public cloud providers either.

128 Technology supports the deployment of highly available 128T Session Smart Routers in the public cloud. The HA solution integrates with the public cloud provider infrastructure in a programmatic manner via the use of APIs (Application Programming Interface). The benefit is to minimize the impact of a network failure, allowing business applications to continue to operate and perform as expected.

This document outlines the HA solution of 128 Technology in more detail.

GOALS

Design a 128 Technology network where the 128T Session Smart Router is not a "single point of failure".

The highly available solution accounts for 128T application failures such as when the secondary node not being reachable or being unresponsive, as well as when an interface's operational status changes to down status.

The API integration of 128 Technology and the public cloud provider is secure via encrypted and authenticated communications.

HOW IT WORKS

The HA solution of 128 Technology for the public cloud consists of an application that runs on each instance of the 128T HA router, and therefore it is collocated with the 128T Session Smart Router software on each node that makes up a 128T HA router.

Each 128T node is periodically monitoring the health status of its remote node, as well as the status of those device interfaces of the remote node that are redundant. The monitoring activity takes place via a HA connection that is established between the 128T nodes via a dedicated network or via the management network.

In the event the 128T router remote node or any redundant device interface become unhealthy, the healthy local node triggers a REST API call to modify the routing table of the public cloud provider's router with the network address of the healthy 128T node as follows:

- If the remote node becomes unhealthy, all managed routing tables whose next hop is a redundant device interface of the remote node failover to the redundant healthy node.
- If a redundant device interface of the remote node changes its operational status to down, all managed routing tables whose next hop is the device interface in question failover to the redundant device interface if its operational status is up.

The routing changes made to the routing table of the public cloud provider's router are not reverted when the unhealthy conditions are resolved.

REQUIREMENTS

The deployment of a 128T Session Smart Router in HA has the following requirements:

- Each network interface of the 128T router, independently of whether the network interface is going to be redundant or not, must be in a different subnet.
- Subnets within the public cloud that are going to be routed via the 128T router must have a dedicated routing table associated/attached which is devoted to 128T only. The 128T router is going to manage and take full control of all the prefixes in this particular routing table.
- The 128T router must have access to the cloud provider API.

NETWORK DESIGN

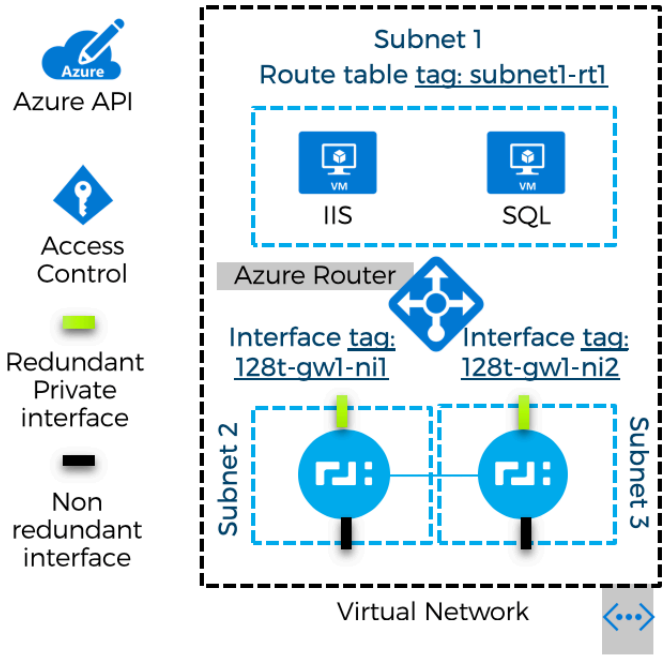
The following section details the network design in addition to step by step instructions for the configuration to be performed for the different cloud providers.

MICROSOFT AZURE

*Testing performed with the following 128 Technology versions: 3.2.7, 4.0.0. Consider testing your specific 128 Technology software version and use case before production.

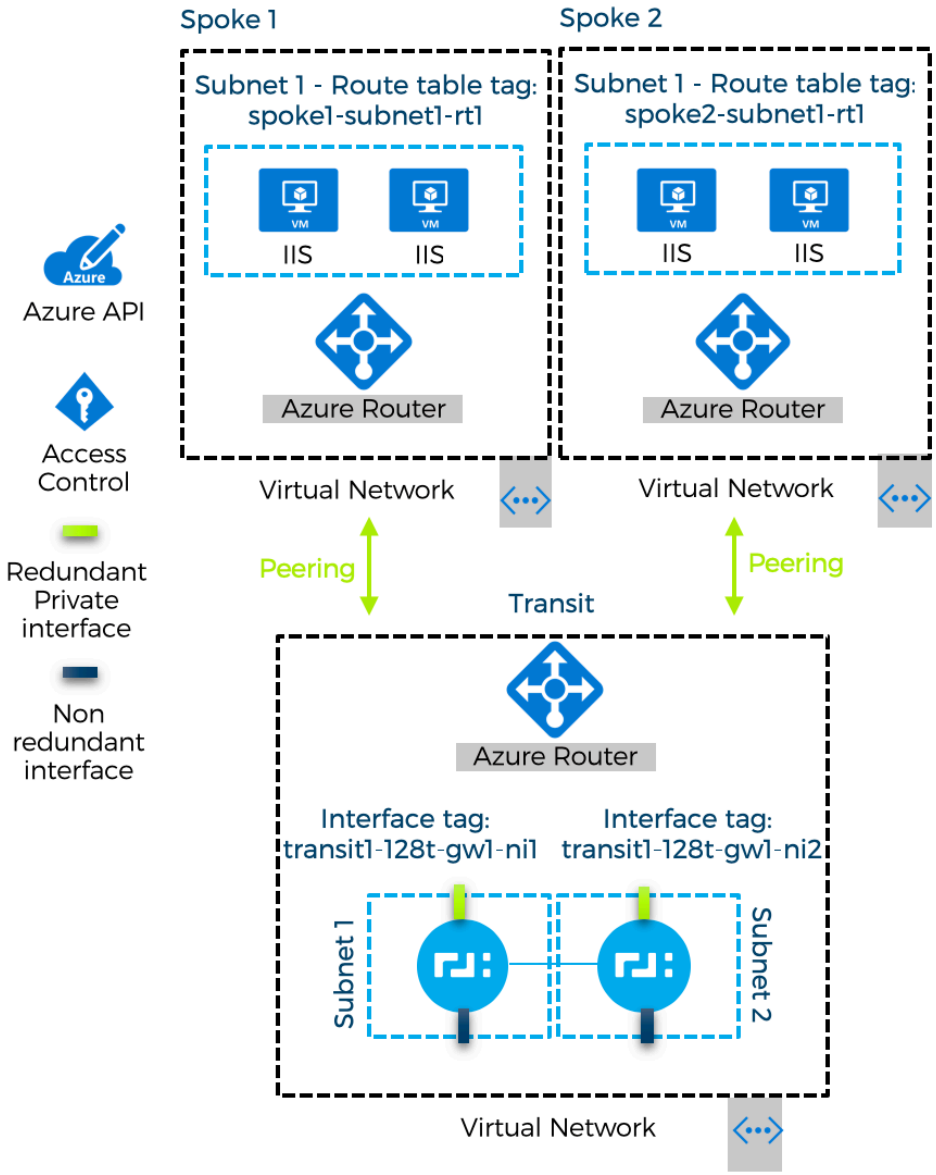
This section describes the network design and configuration steps for Microsoft Azure.

Microsoft Azure represents a datacenter in the cloud with a VNet (Virtual Network). The network design of a VNet with a highly available 128T Session Smart Router in front of backend instances is show next:



The network interface of the 128T HA router facing the backend applications (e.g. IIS, SQL) is redundant. In the event of a failure of any of the 128T nodes/instances or in the event of a redundant private interface changing its operational state to down, the 128T cloud HA solution will update the Azure router to the healthy node and healthy redundant private interface available, allowing the backend applications to continue to operate normally.

A common strategy for enterprises is to create multiple VNets due to organizational efficiency, ownership and access control, security reasons, etc. A common architectural pattern is a transit VNet deployment where multiple VNets need to be connected. The transit VNet allows the creation of a global network transit center which simplifies operations by standardizing processes such as connecting new VNets, providing centralized services, etc.



Every Spoke VNet is peering with the Transit VNet. The redundant network interfaces of the 128T HA router are facing the peering connections. As in the topology previously shown above, in the event of a failure of any of the 128T nodes/instances or the event of a redundant private interface changing its operational state to down, the 128T cloud HA solution will update the Azure router of each Spoke VNet to the healthy node in the Transit VNet and healthy redundant private interface available, allowing the Spoke VNets to continue to operate normally.

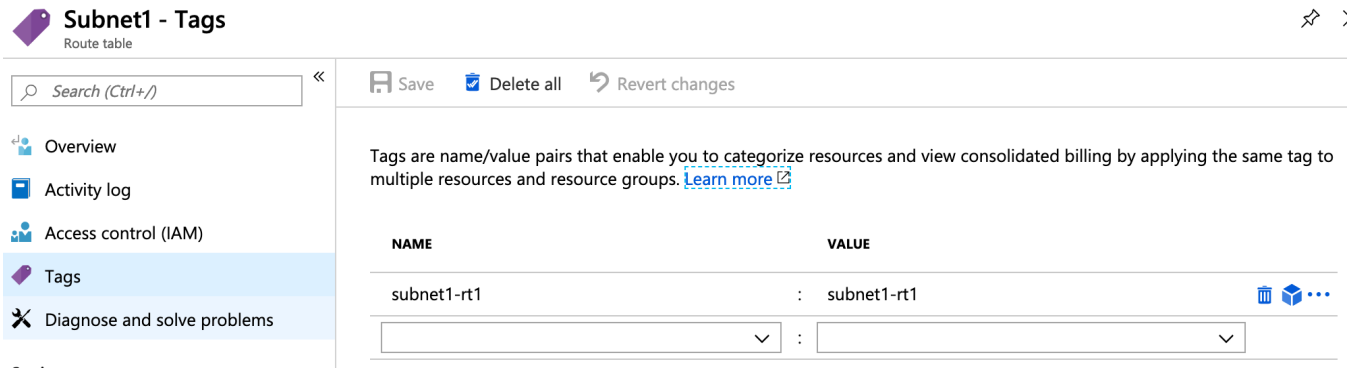
Configuration

This section outlines the configuration steps to complete the highly available deployment of a 128 Technology Session Smart Router as shown in the first image of the previous section.

Review the requirements section and perform the changes to create the necessary subnets and routing tables.

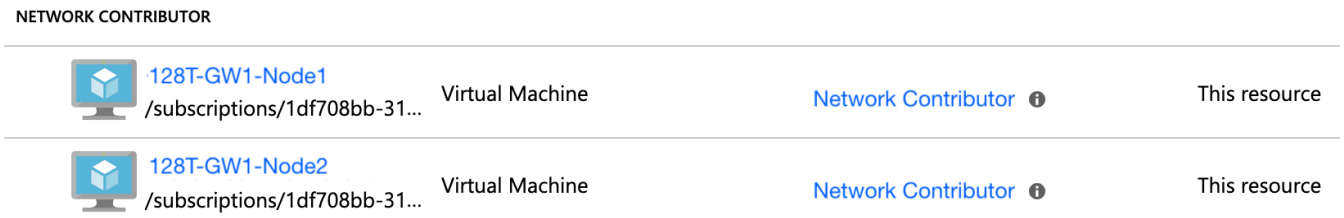
Subnets within the public cloud whose traffic is going to be routed via the 128T router must have a dedicated routing table associated/attached which will be managed by the 128T cloud HA solution. The 128T cloud HA solution identifies this route table to manage by the tag assigned to it.

Click on the corresponding route table and then click on the Tags tab. Assign a tag and click the save button as follows (a tag consists of a key and a value):

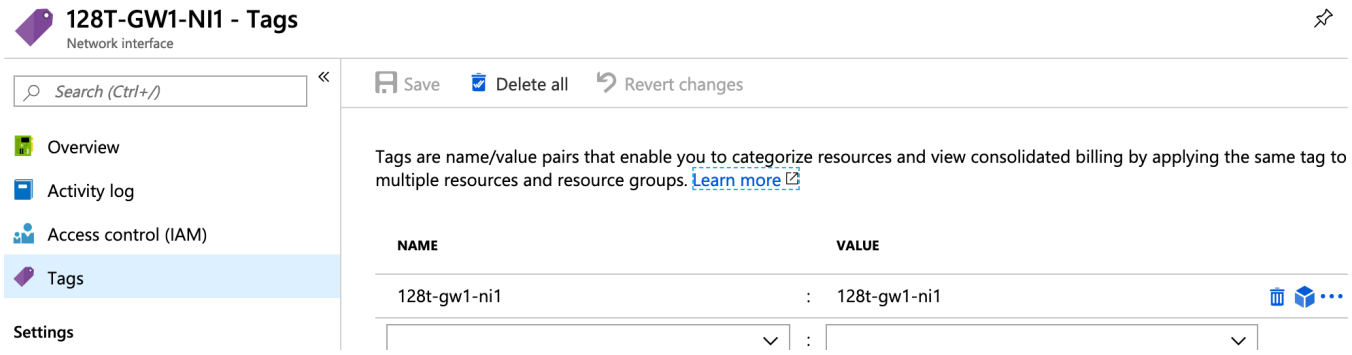


In the example above, the tag assigned to the route table has the key “subnet1-rt1” and value of “subnet1-rt1”.

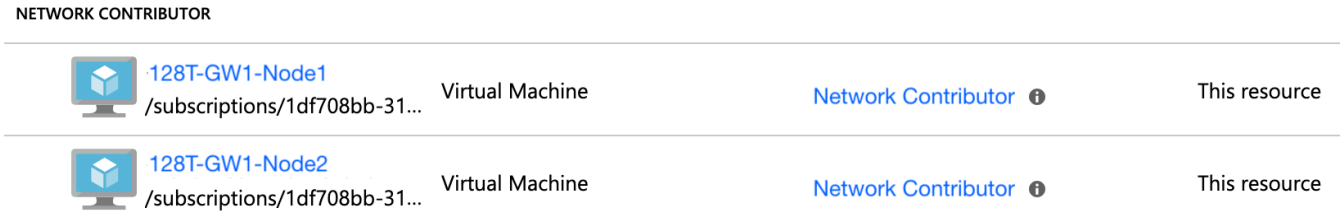
The 128T VM instances of both nodes need access privileges to make changes to the routing table with tags (key and value) “subnet1-rt1” above. Grant them access clicking on the Access Control (IAM) tab of the route table and grant “Network Contributor” role to the instances of both Azure VM instances of both the nodes of the 128T router. The following example shows the result after assigning the role to both VM instances:



Additionally, the 128T VM instances of both nodes need access privileges to the redundant network interfaces as well. Assign a tag to every network interface that is going to be redundant as follows:



Lastly, click on Access Control (IAM) and grant "Network Contributor" role to the VM instances of both nodes of the 128T router as shown next:



Remember to assign a tag and grant a role to every both network interfaces of the redundant group.

128T ROUTER CONFIGURATION

The configuration of a redundant device interface of a 128T Session Smart Router in the public cloud is the same as in a physical environment with the following exceptions:

- The "shared physical address" functionality of the device interfaces belonging to the same redundant group cannot be used. The "shared physical address" field must be empty.
- The "global id" of the device interfaces belonging to the same redundant group do not necessarily need to have the same value.
- The name of the device interfaces belonging to the same redundant group must be the same.
- The network address of the network interfaces belonging to the same redundant group must be different from one another. Each network interface must have assigned:
- The IP address provided by the cloud provider to the instance.
- The network gateway address must be the assigned to the corresponding subnet by the cloud provider.
- A "redundancy-group" configuration is not applicable, so it will not have any effect if exists.

128T CLOUD HA INSTALLATION

The 128T cloud HA solution is not currently publicly available. To obtain the 128T cloud HA solution package please contact your 128T Sales representative.

Once the rpm package has been provided, upload it to the compute instance of each node of the HA router deployed in the public cloud. Upload it to the home directory of the t128 user.

Login to Linux as t128 user on each instance of the node of the HA router and run the next command:

```
#sudo yum install 128T-cloudha-<version>.rpm
```

Repeat the step above to install the 128T-cloudha package on every node.

The command above installs the 128T-cloudha package that is hosted locally on the home directory of the t128 user.

128T CLOUD HA CONFIGURATION

The following section details the configuration of 128T Cloud HA depending on the cloud provider.

MICROSOFT AZURE

The configuration file of the 128T-cloudha solution is under /etc/cloudha/cloudha.conf. Edit it to match your deployment.

As a reference, an example for the network design shown in the previous section would be:

```
{
   "refresh-interval": 10,
   "routers": {
      "128T-GW1": {
         "128T-GW1-Node1": {
            "deviceInterfaces": {
               "LAN": {
                  "networkInterface": {"tagKey": "128t-gw1-ni1", "tagValue": " 128t-gw1-ni1"},
                  "routeTables": [ {"tagKey": "subnet1-rt1", "tagValue": "subnet1-rt1" } ]
               }
            }
         },
         "128T-GW1-Node2": {
            "deviceInterfaces": {
               "LAN": {
```

```
                "networkInterface": {"tagKey": " 128t-gw1-ni2", "tagValue": "128t-gw1-ni2"}
            }
        }
    }
  }
}
```

The configuration above depicts the deployment of a 128T router called “128T-GW1” with two nodes called “128T-GW1-Node1” and “128T-GW1-Node2” respectively. The device interface that is going to be redundant is called “LAN”, please make sure that the name is the same across both the nodes in the router configuration. The 128T node called “128T-GW1-Node1”, device interface “LAN” has associated an Azure network interface whose tag is “128t-gw1-ni1” (key) and “128t-gw1-ni1” (value). The 128T node called “128T-GW1-Node2”, device interface “LAN” has associated an Azure network interface whose tag is “128t-gw1-ni2” (key) and “128t-gw1-ni2” (value). Lastly, all the prefixes of the Azure route table with tag (key and value) called “subnet1-rt1" are going to have a next hop pointing to the device interface “128t-gw1-ni1” of node “128T-GW1-Node1” initially, and only in the event of a failing condition of node “128T-GW1-Node1” all the prefixes of the route table with tag “subnet1-rt1” and hence traffic will be routed to node “128T-GW1-Node2”.

Lastly restart the 128T-cloudha service with the following command:

```
#sudo systemctl restart 128T-cloudha
```

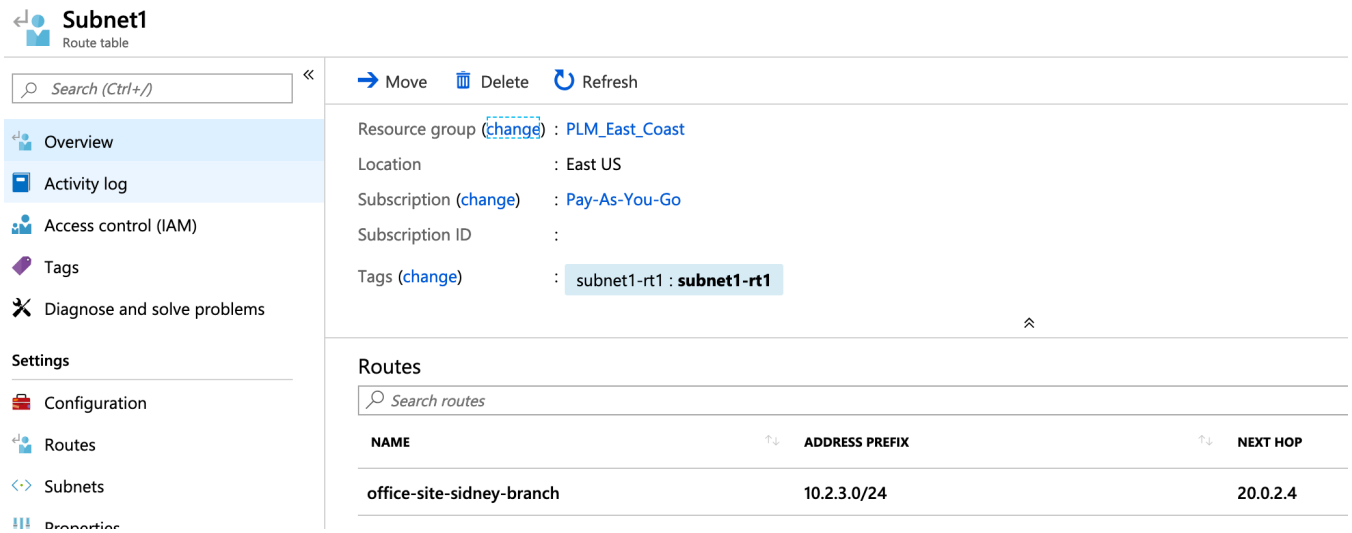
Multiple networks can be routed via a highly available 128T Session Smart Router. For more information, please consult with your 128 Technology Sales representative.

TEST

Once the 128T-cloudha solution have been installed and configured, the solution can be tested as follows:

- Set the device interface property called “enabled” to false. Please make sure the node and the interface selected is the redundant and primary interface. In the example, the primary and redundant interface is the device interface called “mydeviceinterface1” of node “mynode-1”.
- Check that the next hop of every prefix in the routing table of the cloud provider updates to the newly active and healthy redundant interface. In the example, the next-hop should be updated to the IP address of the device interface called “myinterface2” of node “mynode-2”.

Microsoft Azure lists all the routing tables under the “Route Tables” resource. The routers are show selecting the corresponding route table and the “Overview” tab:



The screenshot above shows the Sidney site is currently being accessed via the IP address 20.0.2.4. The IP address 20.0.2.4 corresponds to the IP address of the healthy node of the 128T router responsible of routing the traffic of the subnet/s associated to the route table.

DISCLAIMER

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