WHITE PAPER

SIAMA SYSTEMS

uCPE: The new NID on the Block

The role of Ethernet NIDs in a Virtualized Environment

CSPs are offering customers a "white box" solution that supports several VNFs such as WAN accelerators, routers and firewalls. While this provides increased flexibility in service offerings and lowers the cost of service deployment, it leaves a question in many CSPs minds:

"What do we do about the NID"?

Ethernet services are traditionally deployed with a Network Interface Device (NID) at the customer's premises. The NID provides several functions including a clear demarcation between the Communication Service Provider's (CSP) network and the customer's network, provides VLAN tag stacking capabilities (for CE-VLAN to EVC mapping), supports Service OAM (SOAM) performance and fault monitoring of the Ethernet services and may provide some type of testing or loopback capability. In early Ethernet deployments, these NIDs provided features that could not be supported in network equipment like Provider Edge (PE) switches or routers. Today, Ethernet services and PE equipment has evolved to support many of these NID functions, so there is no longer a requirement to push complex functions to the NIDs at the edge of the network.

In the last decade, we witnessed the proliferation of MEF defined Ethernet Services. CSPs often deployed Field Programmable Gate Array (FPGA) based NIDs as the demarcation device, so that Ethernet service attributes could remotely be upgraded as both standards and market requirements evolved. While the technology served the market well over this period of technology evolution, the NIDs became complex to test, provision and manage (sometimes as complex as a PE) and, ultimately, very costly to procure and deploy. To add to the complexity, NIDs are deployed at the customer premise, not a CSP owned Central Office (CO) or Point of Presence (POP), which makes administration difficult and increases the likelihood of truck rolls. Now that Ethernet service definitions have matured and the PE technology implementations have caught up to the standards, the industry can move away from deploying complex and costly NIDs and move the functions that implement the service attributes back to the optimal location in the CO or POP.

Now we find ourselves in the midst of a virtual revolution. Purpose built hardware is becoming a thing of the past as it is replaced by Commercial Off The Shelf (COTS) servers and Virtual Network Functions (VNFs). CSPs are offering customers a "white box" solution that supports several VNFs such as WAN accelerators, routers and firewalls. While this provides increased flexibility in service offerings and lowers the cost of service deployment, it leaves a question in many CSPs minds: *"What do we do about the NID"?*

If we look back at T1 services that were deployed by CSPs 30 years ago, we see a pattern of deploying a Customer Service Unit (CSU) that performed several functions including providing a point of demarcation, supporting a loopback for testing and performing monitoring of the T1. Customers then began deploying CSUs as their own equipment, sometimes using them to perform proprietary mapping of data packets into the T1, and CSPs deployed "smart jacks" which provided remote loopback capabilities. Today, T1s are deployed with simple RJ-48 jacks that provide a loopback when the RJ-48 plug is removed. Therefore, the CSP T1 demarcation point also started out as a fairly complex and costly device, but eventually matured to a low-cost, simple solution.
If we follow this progression with Ethernet services, we can see how the NID functionality can be absorbed by the "white box". As an example, SOAM can be performed by a VNF on the "white box" rather than by dedicated hardware. VLAN tag stacking and popping can be performed as a VNF rather than in an FPGA.

Siama Systems is developing its GENEM-v virtual applications portfolio to provide solutions to the NID dilemma. The vEthNID application provides SOAM PM capabilities as defined in MEF 35.1 and FM capabilities as defined by MEF 30.1. Siama's vEthSAT supports RFC 2544, Y.1564, MEF 48, MEF 49 and MEF 46 capabilities. These two VNFs replicate functions of our GENEM-X application that

runs on our PROVA-X hardware appliance, but do so in a virtual environment. The table below compares the features provided by NIDs and the functions that our virtual applications support.

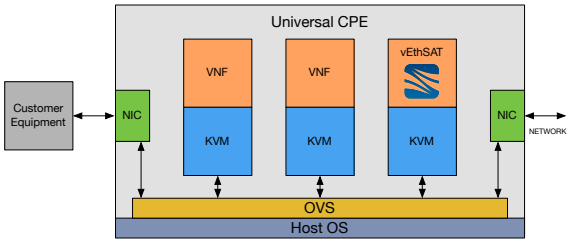
Function	NID	GENEM-v
SOAM Monitoring	Yes	GENEM-vEthNID
Latching Loopback	Yes (often proprietary)	GENEM-vEthSAT
Demarcation Point	Yes	GENEM-vEthNID
VLAN Tag Stacking	Yes	GENEM-vEthNID
RFC 2544/Service Activation Testing	Sometimes	GENEM-vEthSAT

As shown in the table, GENEM-v applications introduce virtual capabilities that meet or exceed purpose built NIDs. With our flexible usage based pricing, CSPs only pay for what they are using when they are using it rather than paying for unneeded capabilities. We have shared two use cases to illustrate this.

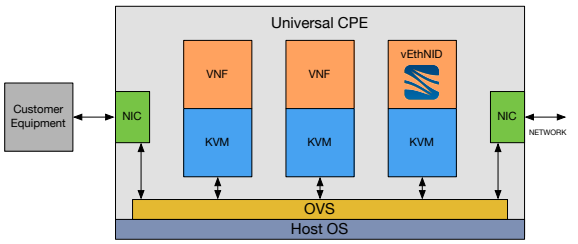
Use Case #1

In this use case, the CSP deploying the service needs to support real-time SOAM monitoring and on-demand testing. They deploy a "white box" at the customer's premises with CPUs that support at least four cores.

For service activation, the GENEM-vEthSAT application is instantiated during the test period but can be removed from the "white box" after the birth-certificate is generated and used at other locations. Siama Systems flexible usage based pricing model only charges for the GENEM-vEthSAT application while it is actually in use, versus a purpose built NID where CSPs pay for SAT capabilities whether they are using them or not.



Once the service has passed its initial testing, the GENEM-vEthNID application is instantiated providing proactive performance monitoring of up to eight services simultaneously. More simultaneous sessions can be supported at an additional cost. SOAM PM functions defined in MEF 35.1 are fully supported including synthetic loss and frame delay measurements. SOAM PM measurements are reported to the CSP OSS/BSS using CSP selected report intervals. Threshold Crossing Alerts (TCAs) can be specified by the CSP and produce autonomous notifications of degradations of measured performance. The GENEM-vEthNID application acts as a virtual demarcation within the "white box". The CSP pays a small yearly fee for each GENEM-vEthNID instantiated on a "white box".

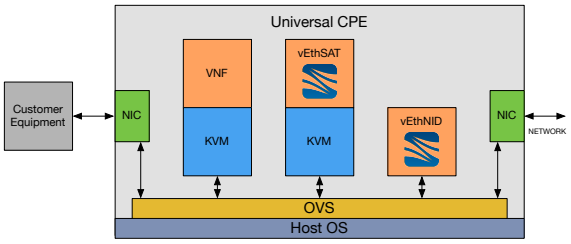


If a significant degradation is detected or if the customer reports a problem, the GENEM-vEthSAT application can be instantiated and perform L2, L3 or L4 testing on-demand to isolate the issue. Once the problem has been resolved and the service retested, the GENEM-vEthSAT application is removed from the "white box" and returned to the application pool where it can be reused.

Use Case #2

In Use Case #2, the CSP is again deploying a "white box" at the customer's premise. In this case, the Ethernet WAN connection to the CSP's network only supports tunneled service. This means that the CSP needs to stack a VLAN tag on all Ethernet frames before they are transmitted to the WAN and remove that tag on all Ethernet frames that are received from the WAN before they are processed. The CSP still has requirements for proactively monitoring the service and wants to be able to perform a latching loopback to support SAT.

CSPs using Siama Systems universal CPE (uCPE) "white box" receive VLAN tag stacking and popping and GENEM-vEthNID functions at no additional cost. These applications share a processor core with the host system to avoid impacting the number of resources available for other VNFs. VLAN tag stacking and popping is configured before testing of the service is performed. Similarly to Use Case #1, the GENEM-vEthSAT application, which is instantiated only during the Service Activation Testing period, is used to test the service. Once the SAT testing is completed, the GENEM-vEthSAT application is removed from the uCPE. The GENEM-vEthNID application included on the uCPE is configured to proactively monitor the services.



Conclusion

Using Siama Systems family of GENEM-v applications provide CSPs with affordable virtual solutions that can remove the need to deploy an additional device like a traditional NID at the customer's premises. Instead, all NID functions are supported as VNFs that are able to be run in conjunction with other VNFs on a single "white box". Siama Systems uCPE also provides more efficient use of processing resources by instantiating GENEM-vEthNID and VLAN tag applications on the same processor as the host is running. This ensures that processing resources are available for customer desired applications without the CSP losing critical visibility to the performance of the service.

For more information on Siama Systems' virtualized solutions portfolio, send an email to: virtualization@siamasystems.com

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