Wireshark Developer and User Conference

Increasing the Throughput of Network Appliances through Virtualization

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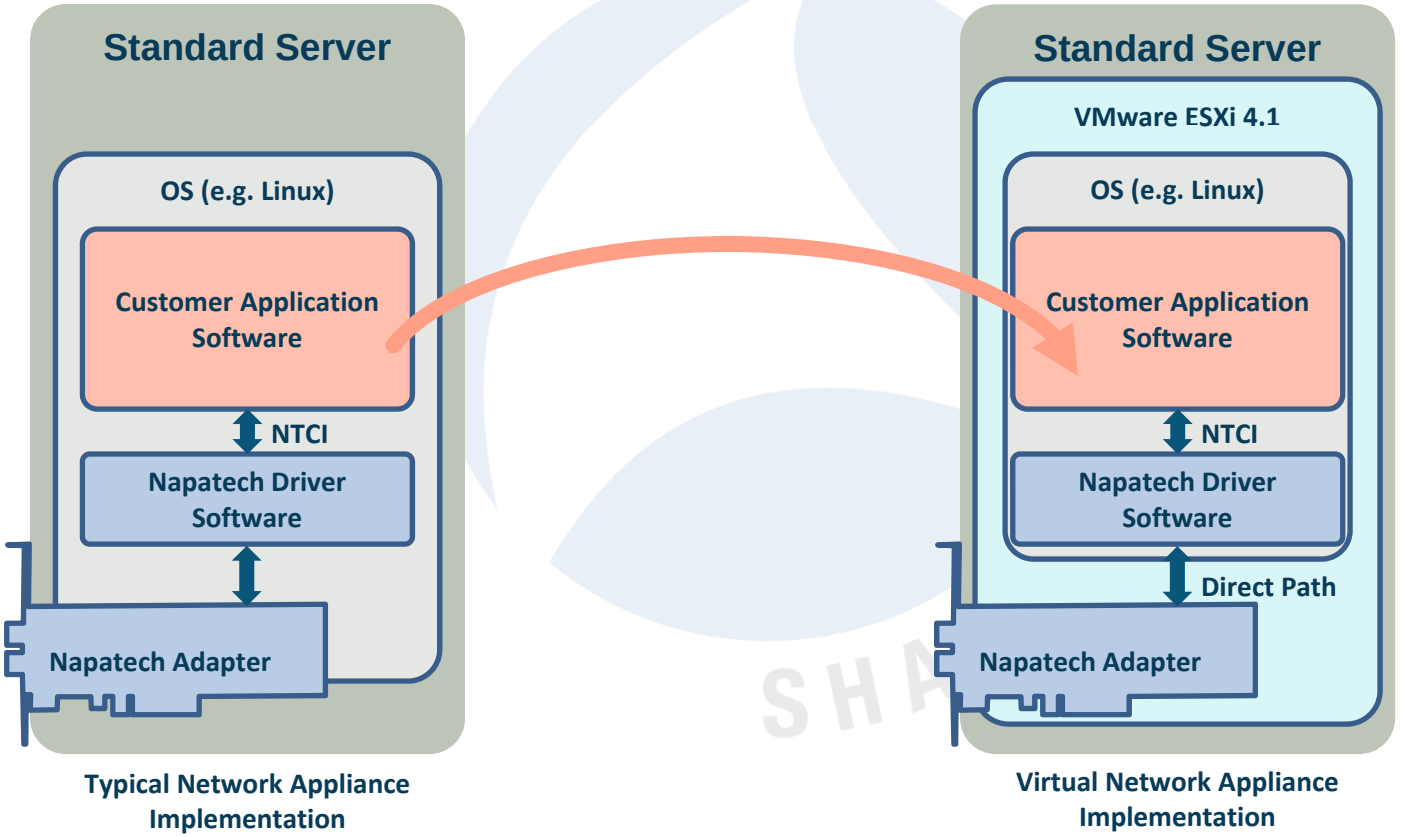
What problem does virtualized appliances solve?

- Power consumption and space are top-of-mind issues for data centers
  - Any solution that reduces the number of physical devices is welcome
- Many data centers standardize on server hardware to ease maintenance, support, etc.
  - Virtualization allows a network appliance to be instantiated on any virualized hardware platform.
- Many types of network appliances used to monitor, analyze and secure
  - Many need access to the same data at the same point in the network
  - Often requires extra Load Balancer device to distribute data
  - Consolidating appliances on a single platform an advantage in cost, space and complexity
- Virtualization enables consolidation

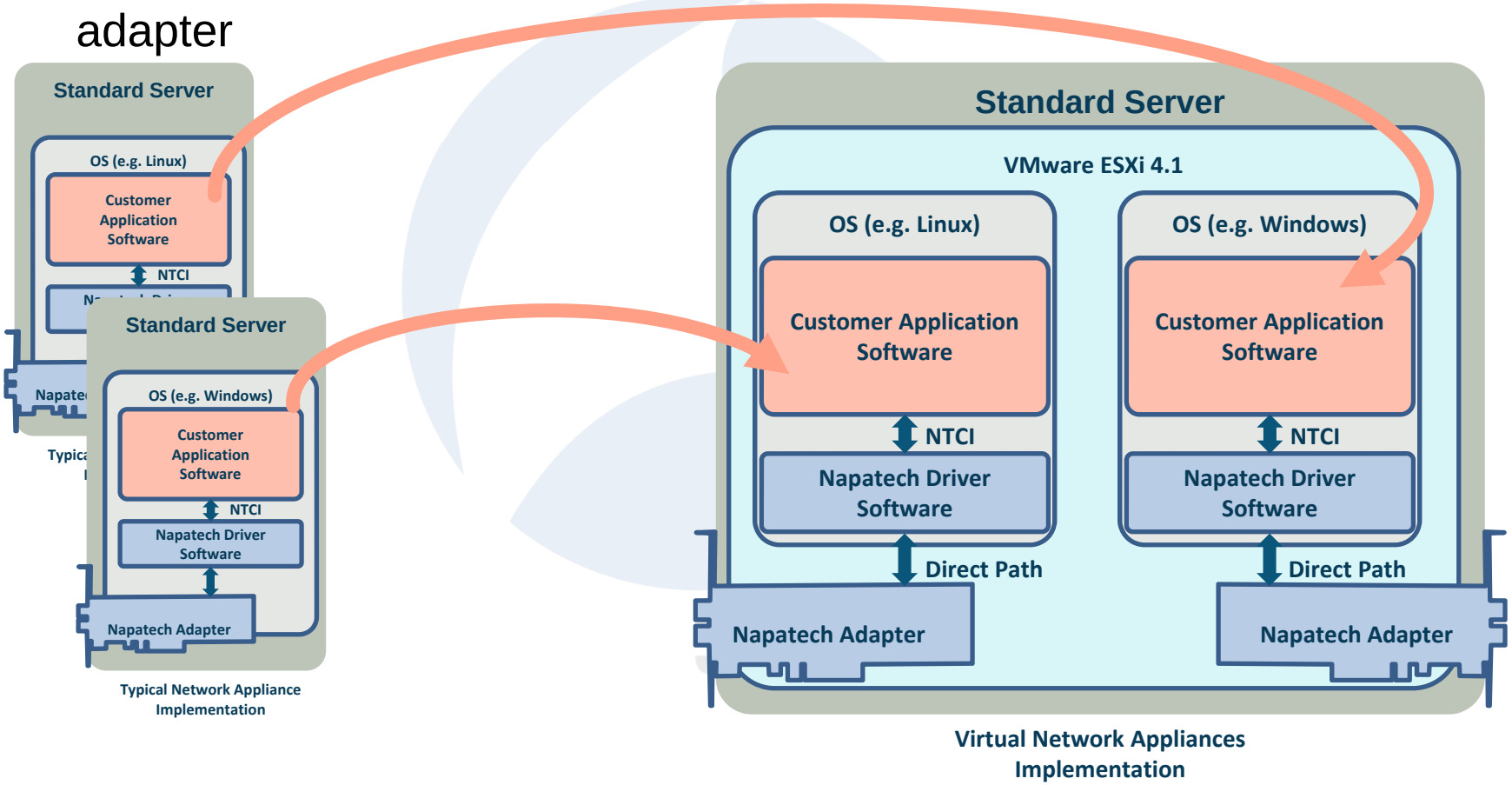
From physical to virtualized appliances

- VMware Direct Path allows 1 Virtual Machine (VM) to control the network adapter
- Allows existing network appliance application to be migrated to virtual appliance



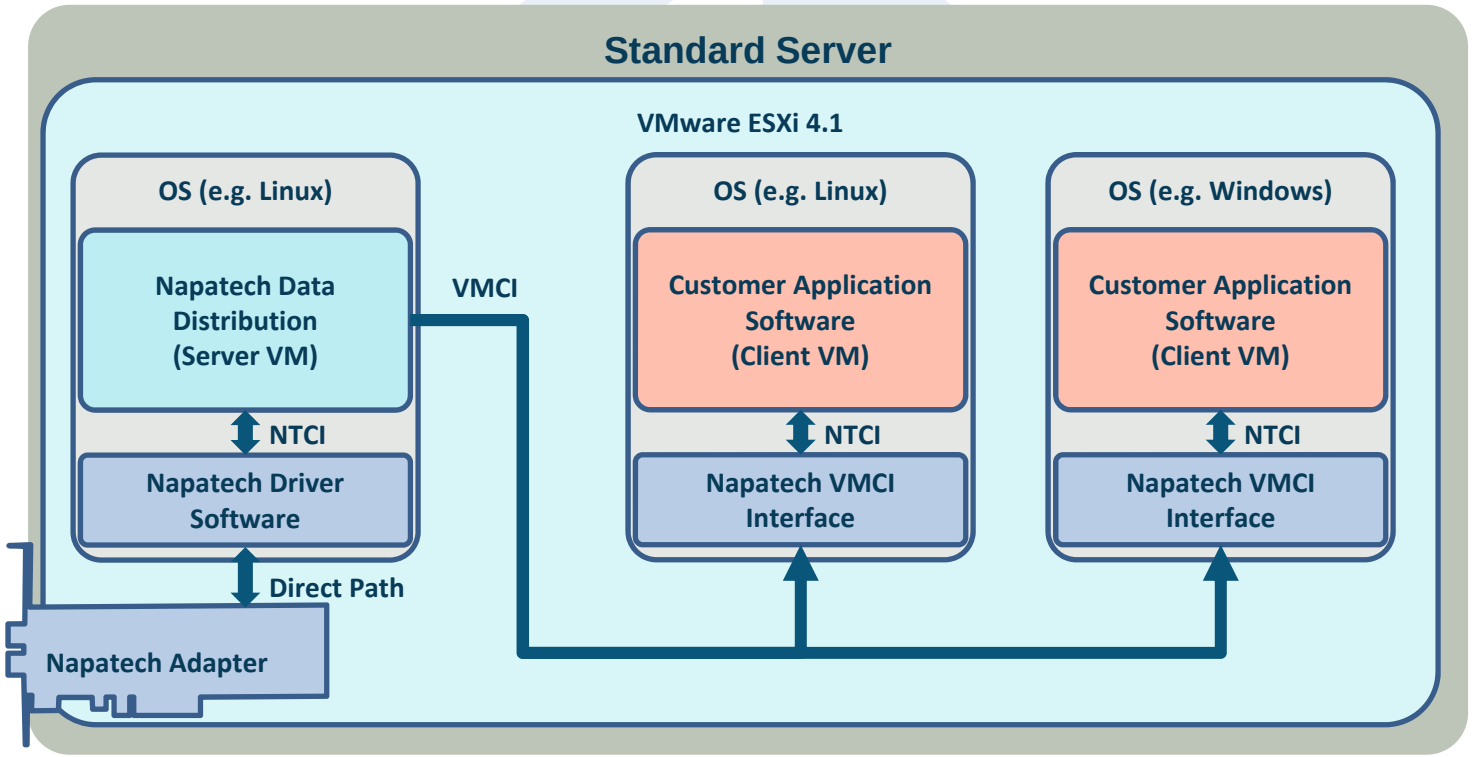
Multiple virtualized appliances

- Multiple network appliances with different operating systems can be migrated to one consolidated virtual network appliance server
- However, with Direct Path, each VM needs its own network adapter



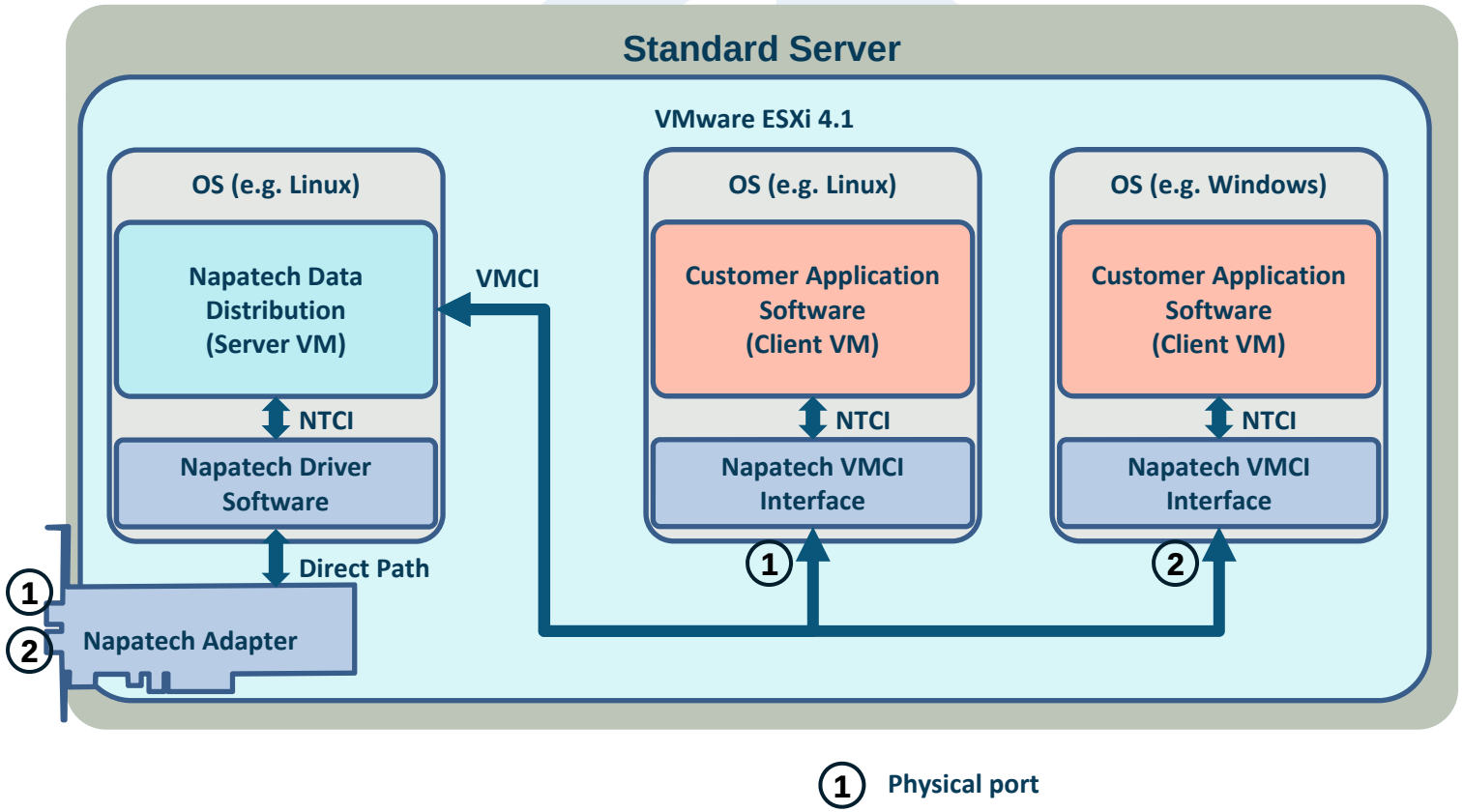
Multiple network appliances sharing a network adapter

- For cases where multiple network appliances need to monitor same connection, but for different types of traffic sharing a network adapter makes sense
- Napatech Data Distribution solution allows multiple network appliances to share a single network adapter



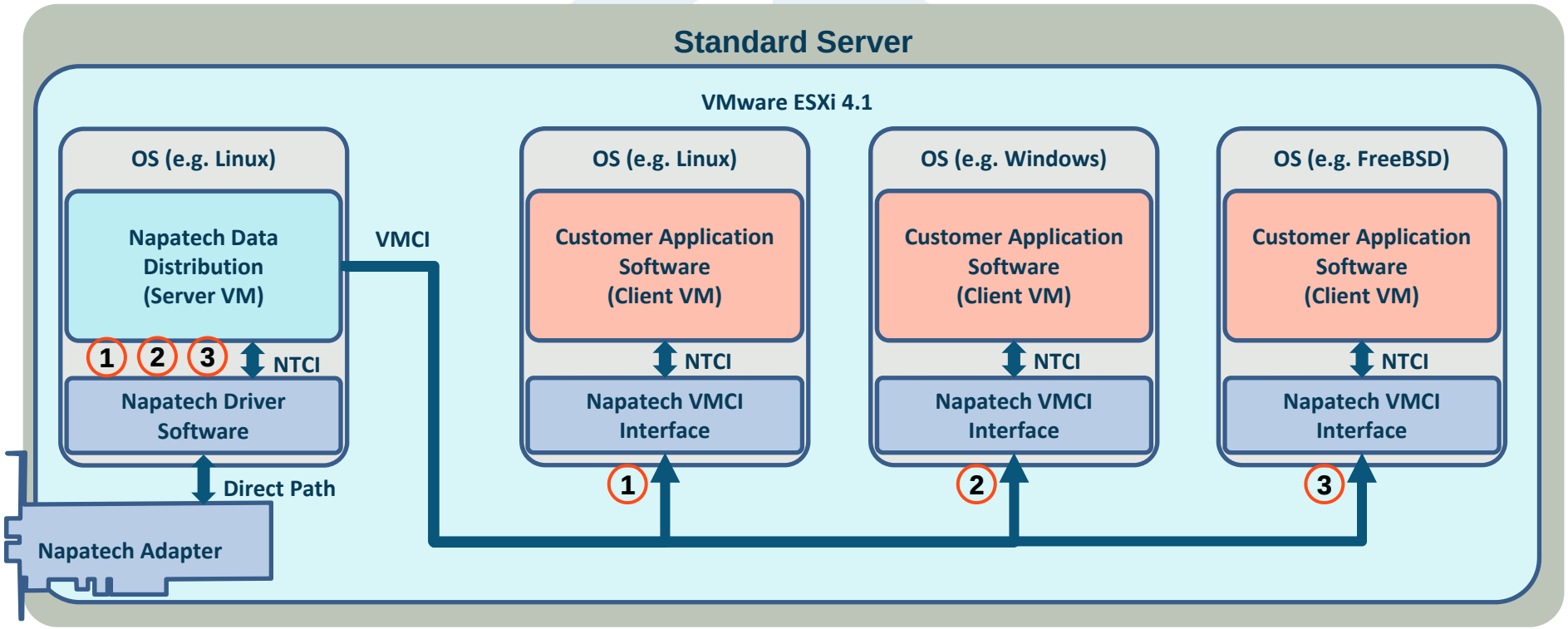
Mapping ports to multiple virtual machines

- Napatech Data Distribution server VM uses Direct Path to control Napatech network adapter and VMware VMCI virtual socket interface for data distribution
- In this example, traffic from each port is mapped to a different VM



Data distribution to multiple virtual machines

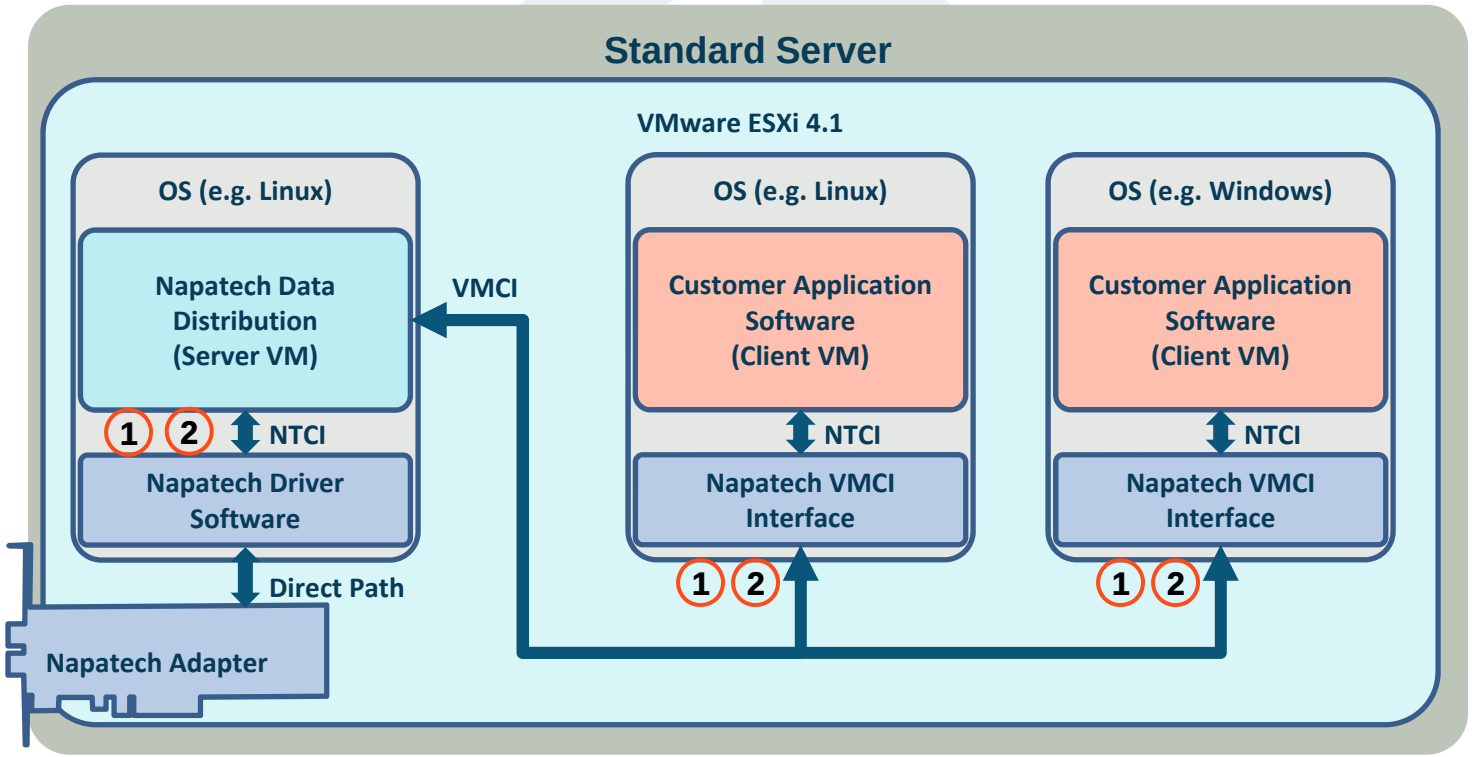
- In cases where more clients need to access data, data distribution is required
- Napatech network adapter is configured to provide up to 32 logical ports
- Balancing across VMs using hardware filters, IP flow, or a combination of both.
- Each port becomes a VMware VMCI port with 1 VMCI port per Client VM



1 Logical port = VMCI port (max 32 logical ports)

Data replication to multiple virtual machines

- For cases where multiple network appliances need to access the same data at the same time, data replication is preferred
- Up to 32 logical ports can be replicated over VMCI interface
- VMCI used for copying data (i.e. No copying in adapter or Client VM OS)



Performance and limitations

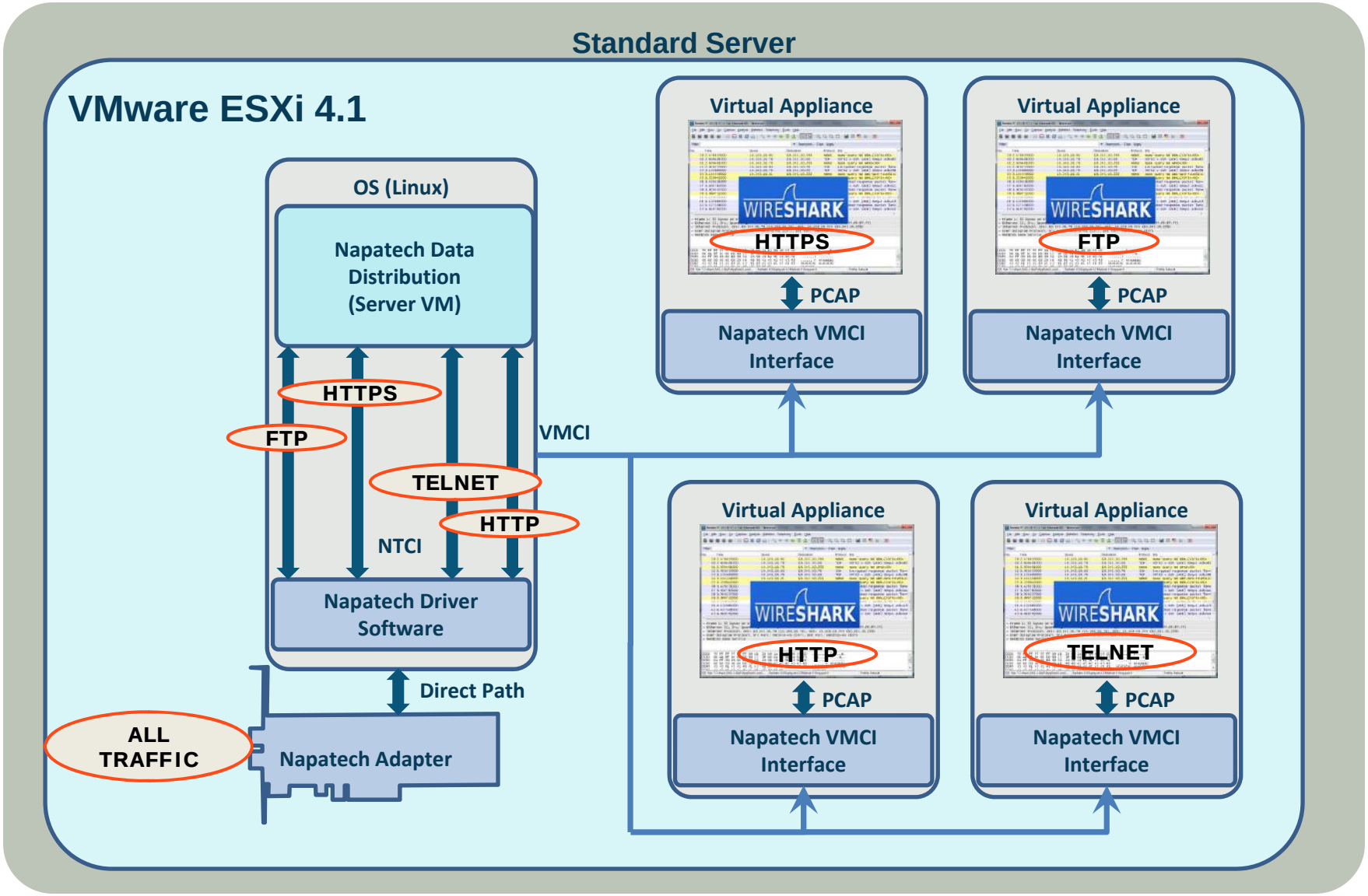
- Performance of Data Distribution solution is limited by two factors:
  - CPU core performance
  - Maximum number of VM clients allowed by customers' VMware license
- Solution CPU core consumption
  - Napatech Data Distribution VM consumes 1 CPU core
  - VMCI consumes 1 CPU core
- Preliminary tests of mainstream standard servers show:
  - 30 Gbps VMCI transfer capacity for 2.40 GHz Westmere Xeon 5620 CPU cores
- For Data Distribution of physical or logical ports to multiple VMs:
  - Solution limited to 32 VMs
- For Data Replication to multiple VMs:
  - Solution limited to VMCI transfer capacity

Example configurations for Westmere platforms

- Using a Intel Westmere based server, we are able to support 30 Gbps across the VM interface using either a 4 x 1 Gbps, 2 x 10 Gbps or 1 x 40 Gbps Napatech adapter (PCIe Gen 2 limit = 25 Gbps)
- Intelligent distribution features of Napatech network adapters allows traffic to be distributed to between 1 and 32 VMs on a round-robin, protocol or flow basis
- VMCI copies data to be sent to 2 or more Client VMs

Port Type	Configuration	Aggregate VMCI Bandwidth
4 x 1 Gbps	Each 1 Gbps port to a separate Client VM	4 VMs x 1 Gbps = 4 Gbps
4 x 1 Gbps	Each 1 Gbps port to 2 Client VMs (8 in total)	8 VMs x 1 Gbps = 8 Gbps
4 x 1 Gbps	4 ports merged to 1 Client VM	1 VM x 4 Gbps = 4 Gbps
4 x 1 Gbps	4 ports merged and shared to 3 Client VMs	3 VMs x 4 Gbps = 12 Gbps
2 x 10 Gbps	Each 10 Gbps port to a separate Client VM	2 VMs x 10 Gbps = 20 Gbps
1 x 10 Gbps	Balance port traffic over 10 Client VMs	10 VMs x 1 Gbps = 10 Gbps
1 x 10 Gbps	Port shared to 2 Client VMs	2 VMs x 10 Gbps = 20 Gbps
2 x 1 Gbps	Balance traffic over 5 VMs	5 VMs x 200 Mbps = 2 Gbps
1 x 40 Gbps	Balance 25 Gbps over 8 VMs	8 VMs x 3,125 Gbps = 25 Gbps

Data Distribution Demo Using Filters



Data Duplication Demo