



ITU Kaleidoscope 2011

The fully networked human?
Innovations for future networks and services

Seamless Cloud Abstraction, Model and Interfaces

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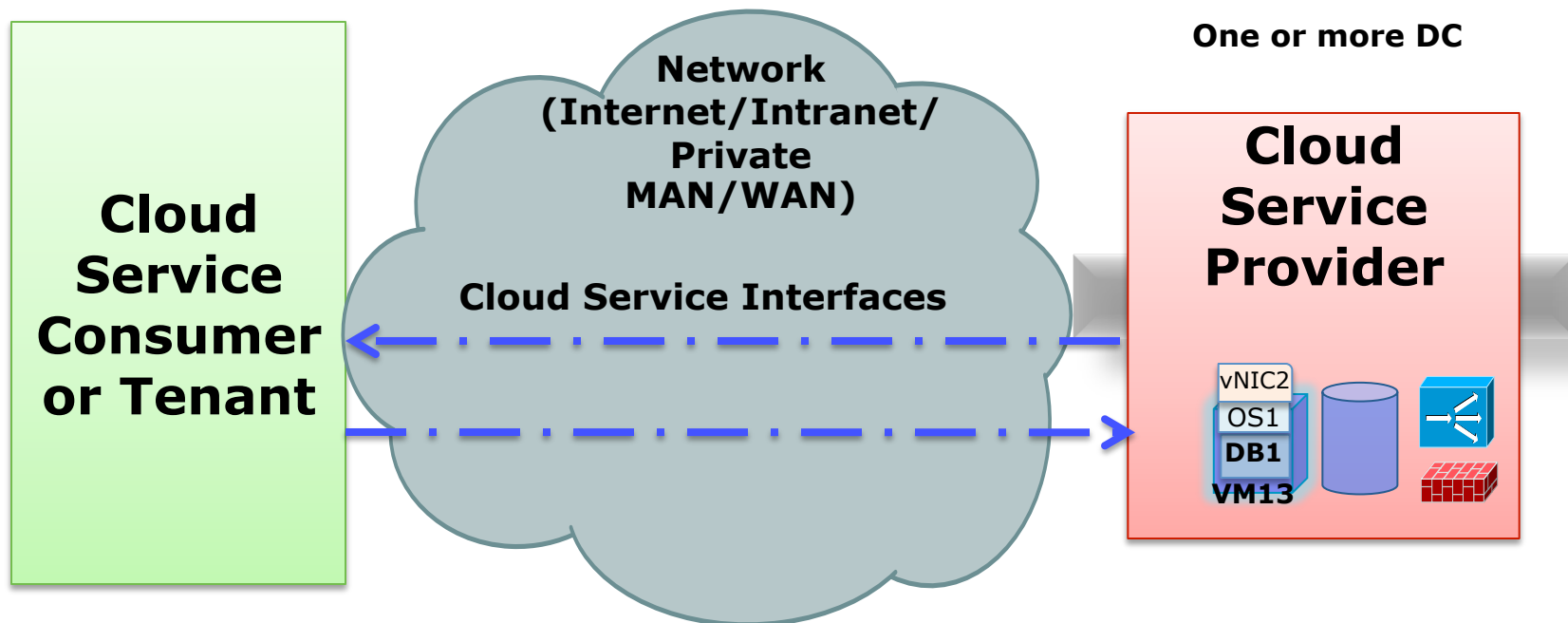
Cape Town, South Africa
12–14 December 2011



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Cloud Computing - Introduction



- ❑ IaaS: Infrastructure resources
- ❑ PaaS: Software middleware, development & test resources
- ❑ SaaS: Application product resources

Cloud Deployment – NIST Definition

- ❑ Private Cloud: For use by an enterprise only
 - ❑ Owned / operated by enterprise IT or 3rd party

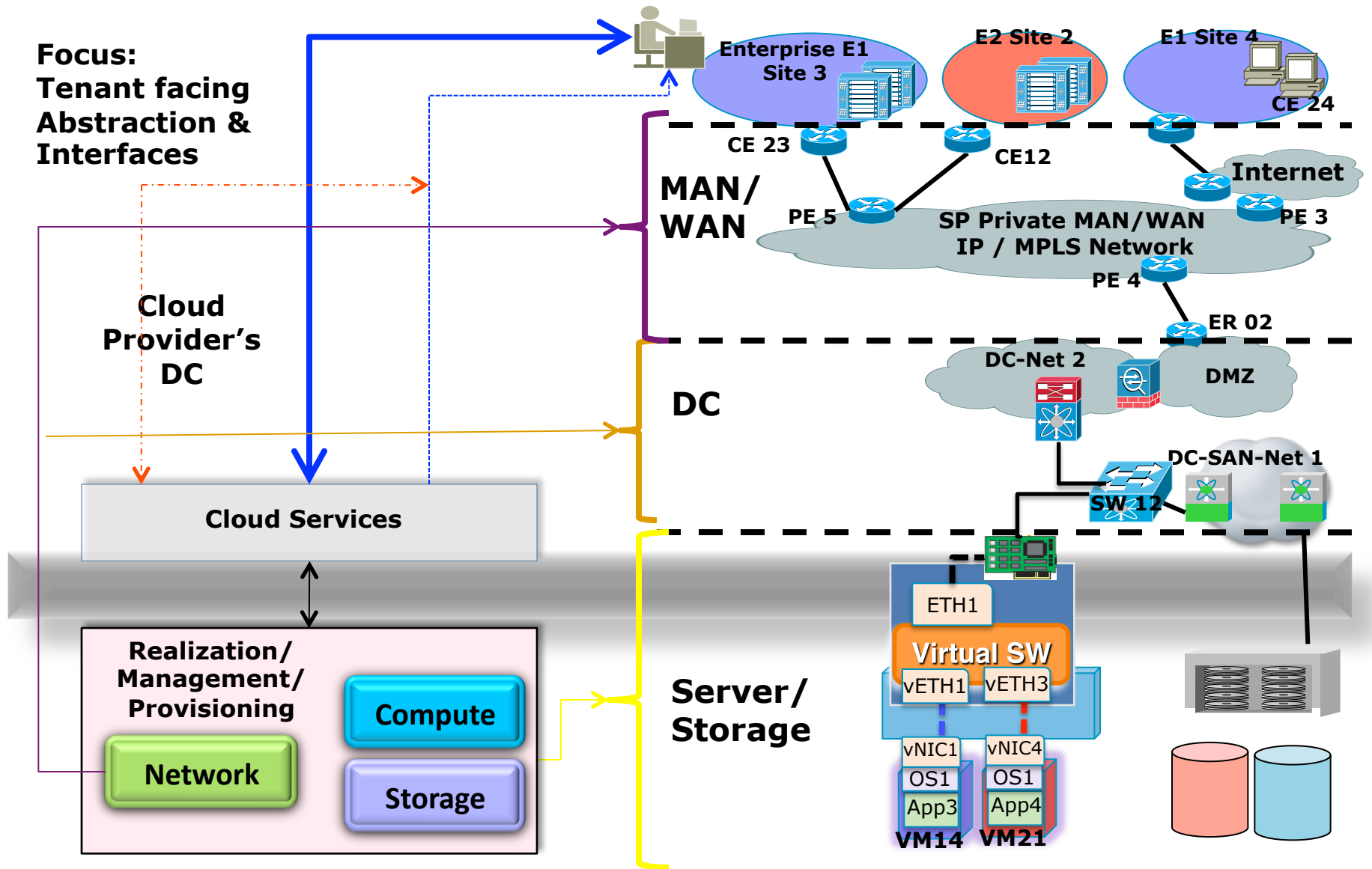
- ❑ Public Cloud: For use by anyone
 - ❑ Owned / operated / offered by a Cloud Service Provider

- ❑ Hybrid Cloud: Multiple interoperable Clouds that enables data and application portability
 - ❑ Multiple operators

Seamless Hybrid Cloud

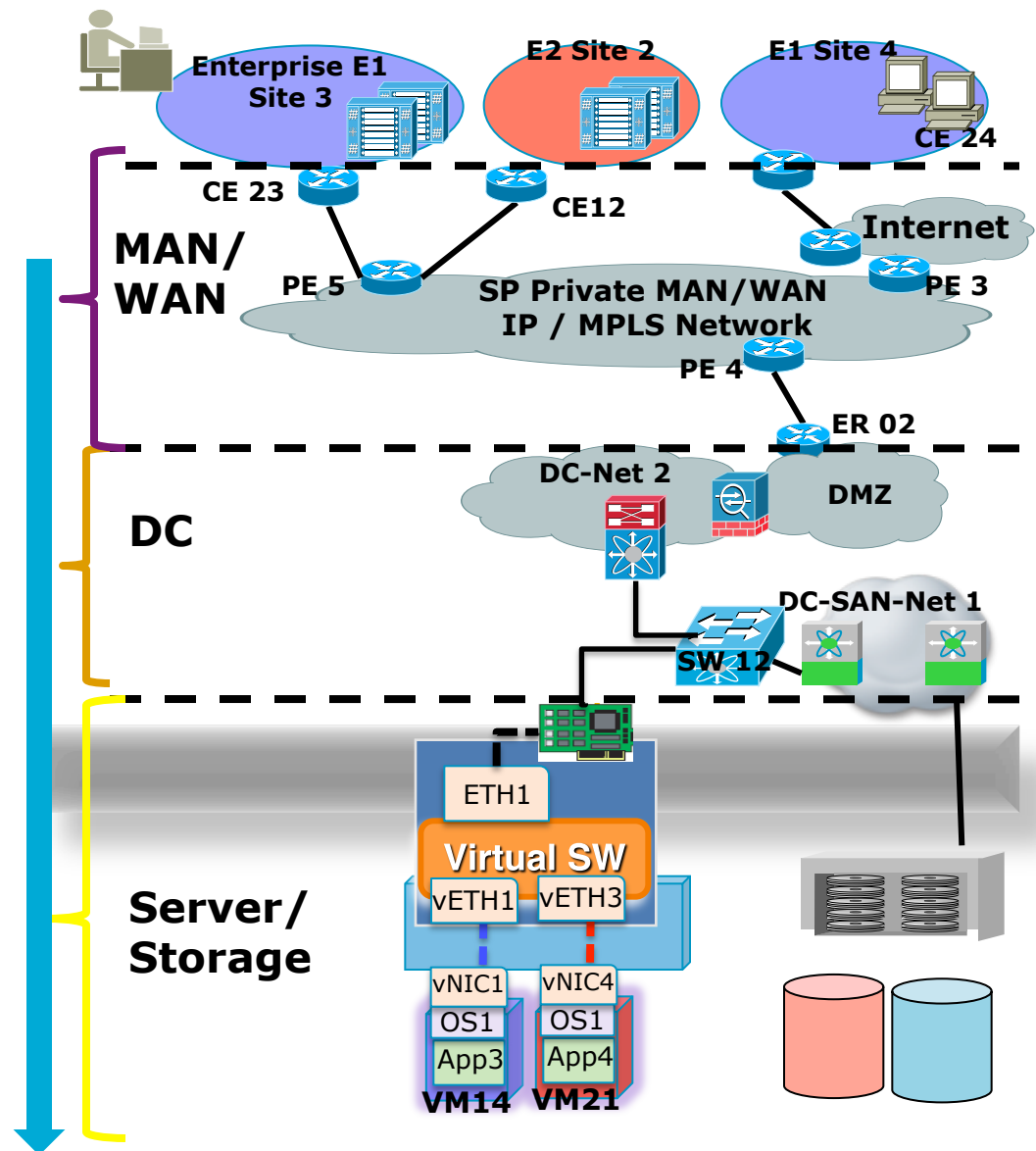
- ❑ With Hybrid Cloud enterprises may have resources distributed in Enterprise intranet and one or more Public Clouds
- ❑ Enterprise should be able to execute apps on these distributed resources seamlessly as if they are on the intranet
- ❑ Manage distributed on-premises and off-premises Cloud resources seamlessly with IT resources
- ❑ Seamless Hybrid Cloud Abstraction, Interfaces and their realization on infrastructure will facilitate above

Cloud Management Framework

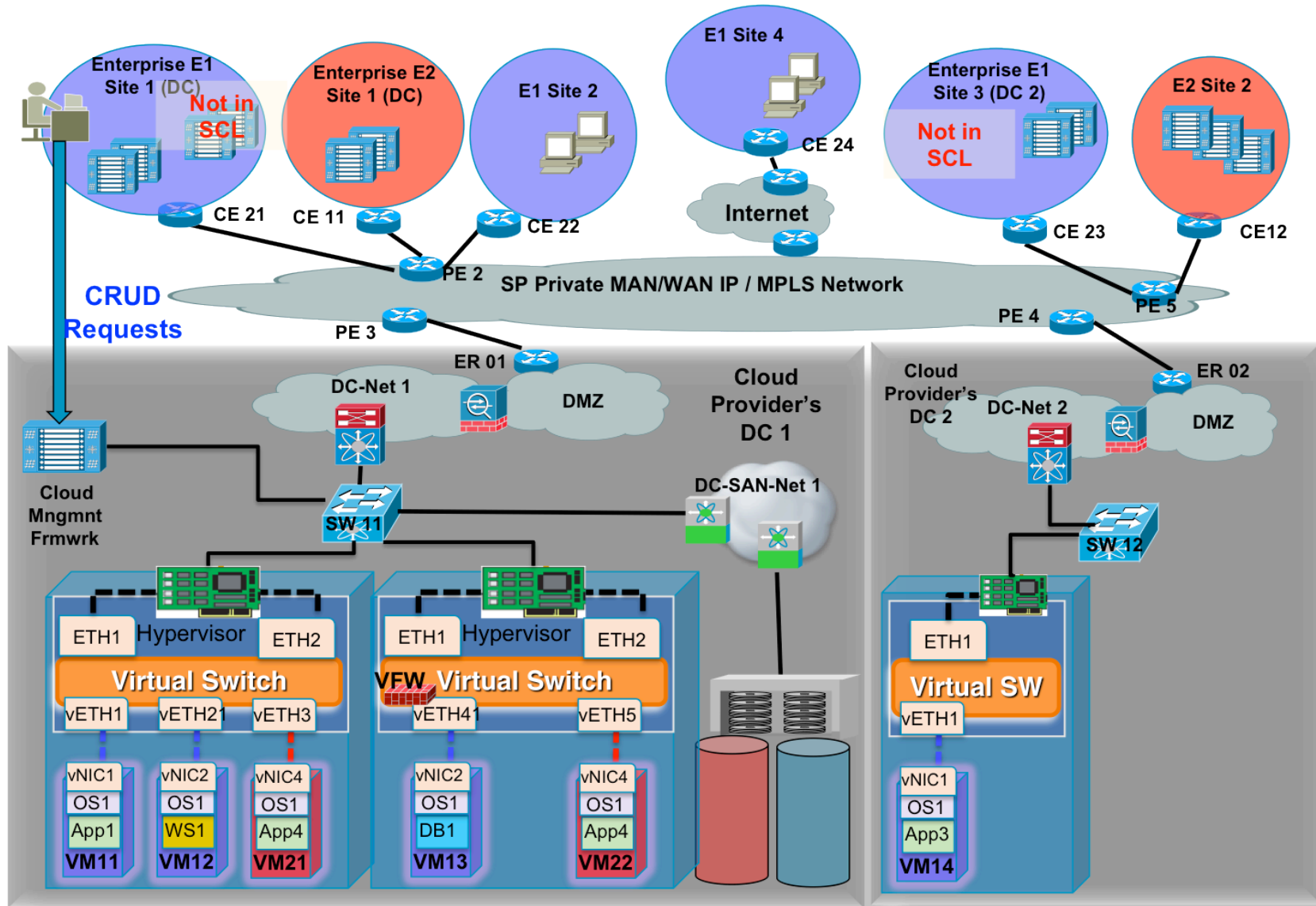


Multitenancy & Isolation Abstraction

- Multiple Tenants sharing E2E
- Cloud Isolation Abstraction: CLIA
- Network isolation technology, VLAN, VPN, Tunnel, Routing/Switching [table] isolation: VRF, etc., independent abstraction
- CLIA abstracts network isolation for each tenant into one Cloud abstraction



Full Network View - Example

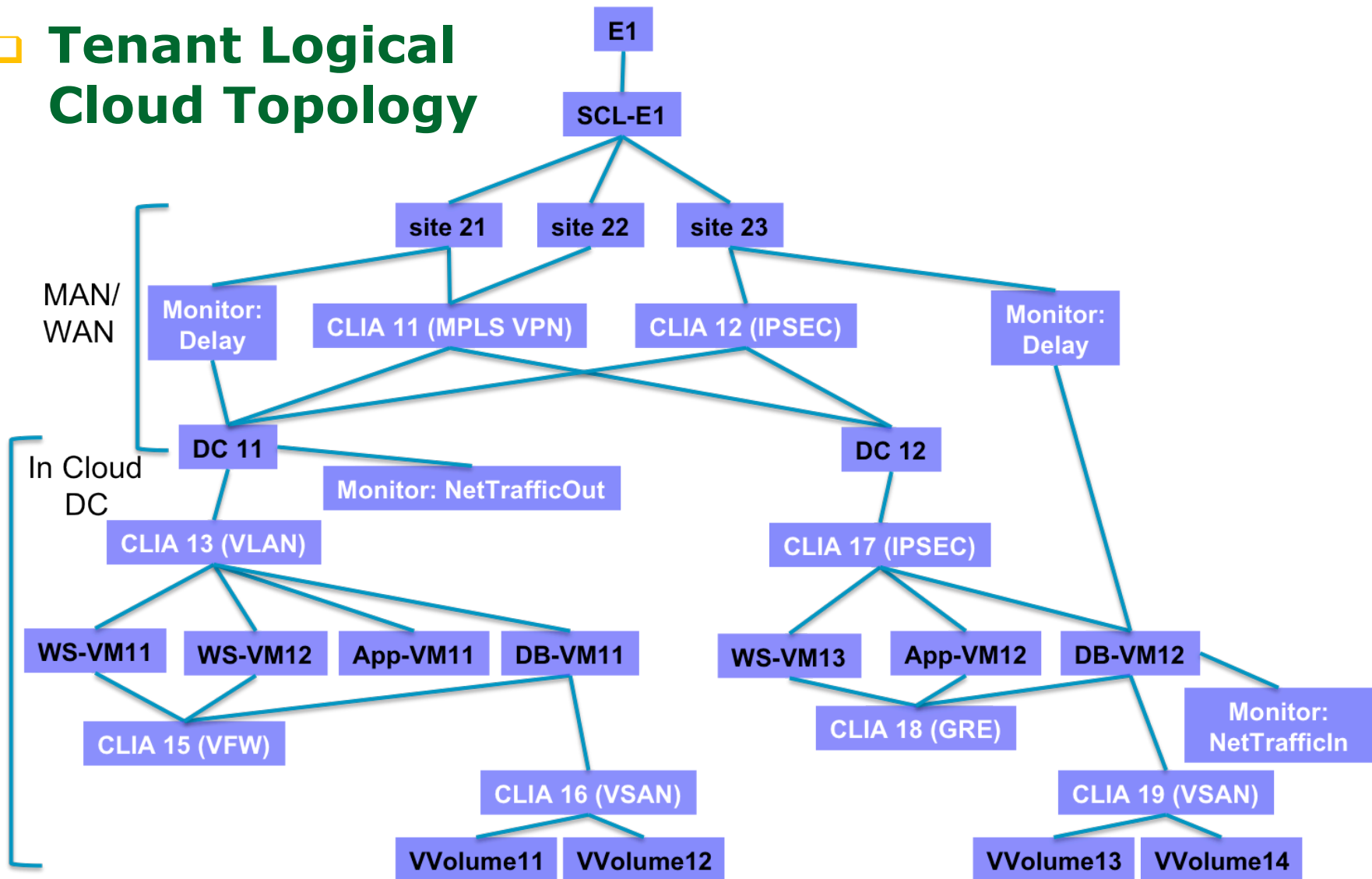


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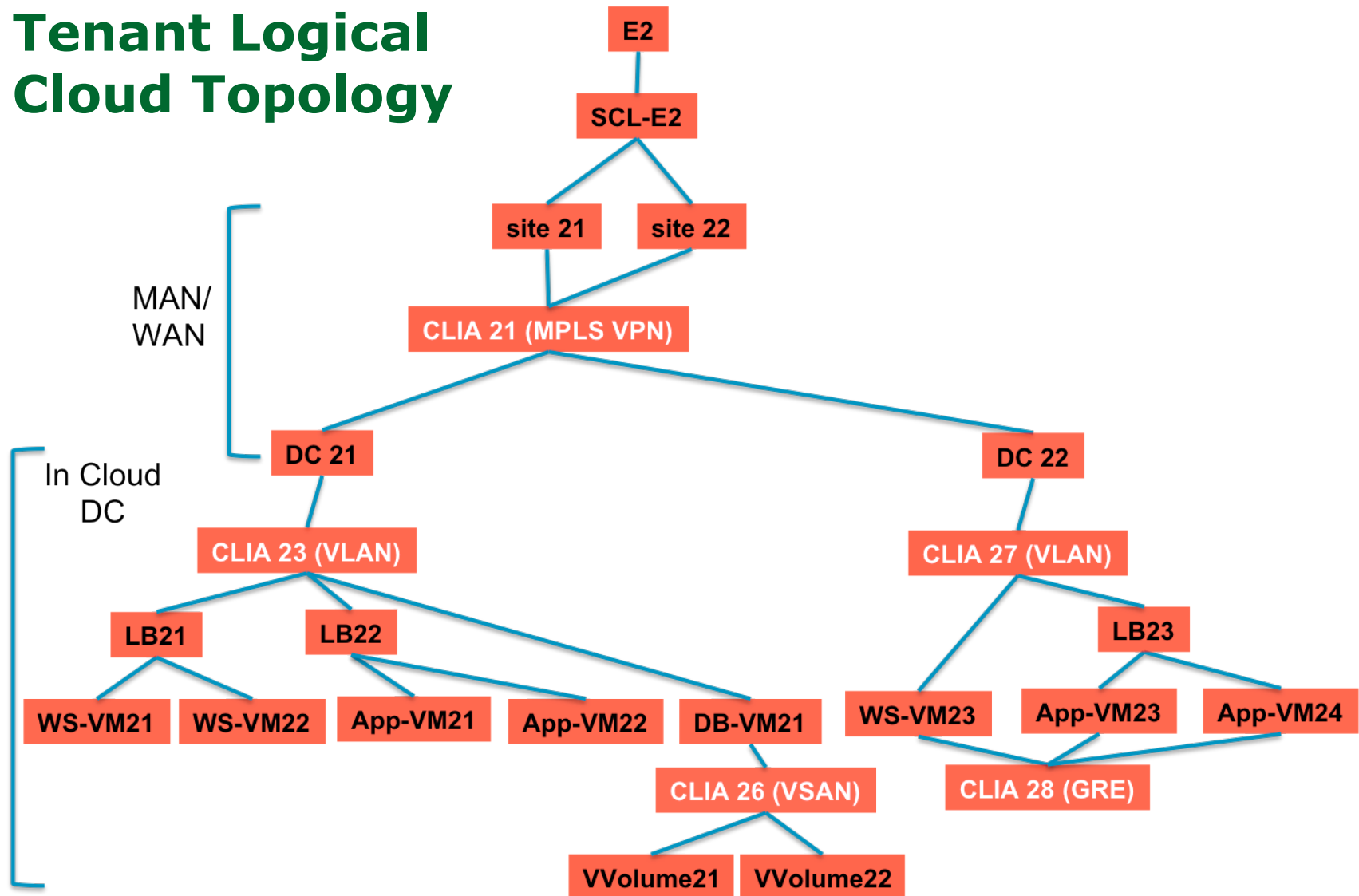
Seamless Cloud Abstraction

□ Tenant Logical Cloud Topology



Seamless Cloud Abstraction

□ Tenant Logical Cloud Topology



Differentiated Quality of Cloud Services

- ❑ QoS associated with SCL
- ❑ QoS abstraction: Platinum, Gold, etc. applied in aggregate
- ❑ QoS abstraction defined based on Application Classes as defined in RFC 4594
 - ❑ Example: Multimedia Conferencing
 - ❑ Loss/Delay/Jitter bound: .001/100ms/50ms
 - ❑ DiffServ (DSCP) marking: AF41/42/43

Conclusion

- ❑ SCL and CLIA abstractions and their realization ...
- ❑ Allows secure and seamless integration of tenant's enterprise to Public Cloud
- ❑ Simplifies Cloud usage by tenants
- ❑ Allows CSP offer sophisticated SP & Enterprise grade Cloud services
- ❑ Allows seamless execution of applications on resources distributed over Clouds together with enterprise resident resources
- ❑ Allows seamless management of Cloud resources together with enterprise IT resources

Further Work

- ❑ Abstraction realization in network via network management systems
- ❑ CLIA realization via PPVPN (Provider Provided VPN) extension to support Seamless Hybrid Cloud
- ❑ Extension to cover multiple CSP
- ❑ Incorporation in OpenStack (an open source Cloud Stack)
- ❑ Standardization
 - ❑ Tenant \leftrightarrow CSP, CSP \leftrightarrow CSP interoperability, interfaces
 - ❑ Compute/VM, Storage and Network level interoperability, interfaces