

VNF Pool Use Cases

Requirements and Use Cases for Virtual Network Functions

[draft-xia-vnfpool-use-cases-01](#)

Virtualisation of Mobile Core Network Use Case

[draft-king-vnfpool-mobile-use-case-01](#)

Virtualisation of Content Distribution Network Use Case

[draft-aranda-vnfpool-cdn-use-case-00](#)

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VNF Pool – Use Case Presenters

1. Requirements and Use Cases for Virtual Network Functions

Provides an analysis of the key reliability requirements for applications and functions that may be hosted within a virtualized network function (VNF).

- draft-xia-vnfpool-use-cases-01
Presenter: Masaki Fukushima , KDDI

2. Virtualisation of Mobile Core Network Use Case

Use case document providing resiliency requirements for virtualization of the LTE mobile core network, known as virtualized EPC (vEPC).

- draft-king-vnfpool-mobile-use-case-01
Presenter: Marco Liebsch, NEC

3. Virtualisation of Content Distribution Network Use Case

Use case document highlighting resiliency requirements for virtualization of the Content Distribution Network (vCDN).

- draft-aranda-vnfpool-cdn-use-case-00
Presenter: Oscar Gonzalez De Dios , Telefonica

draft-xia-vnfpool-use-cases-01

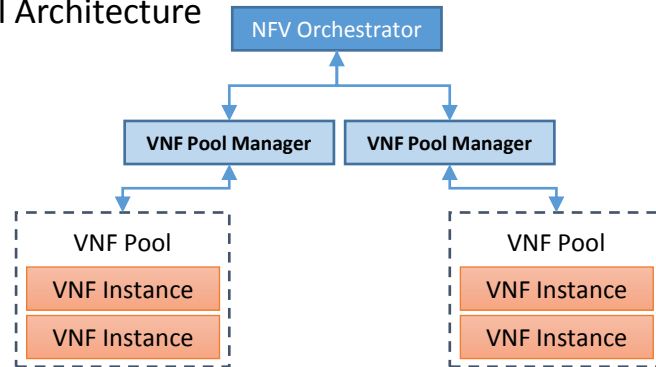
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Updates since IETF 89

- Clarified VNF Pool Architecture



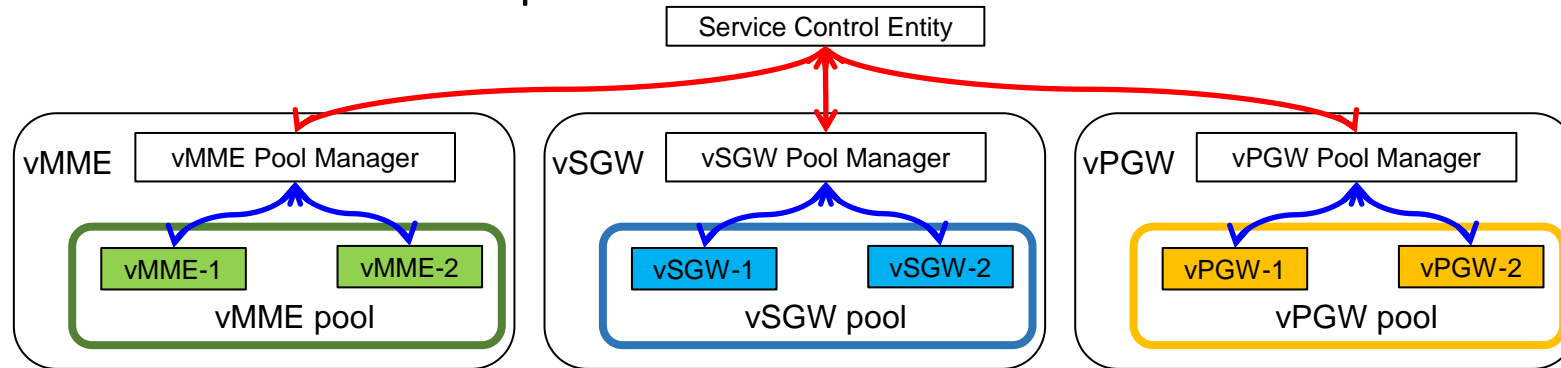
- Redundancy management in a single VNF pool
- Synchronized terminology (Use Case and Problem Statement I-Ds).
- General Resilience Requirements For VNF Use Cases
 - Synchronization is out of scope
 - Combining Different VNF Functions in single VNF Pool is out of scope
 - Scaling (CPU/Memory) of Virtual Network Function Instances
 - Reliable Network Connectivity between Network Nodes
 - Existing Operating Virtual Network Function Instance Replacement
 - VNF Resilience Classes
- Service continuity
 - Optimal placement of pool elements across multiple VNF pools is the responsibility of the Service Control Entity, thus is out of our scope
 - Optimal placement of PEs within a single VNF pool is in the scope

Two new scenarios & Requirements

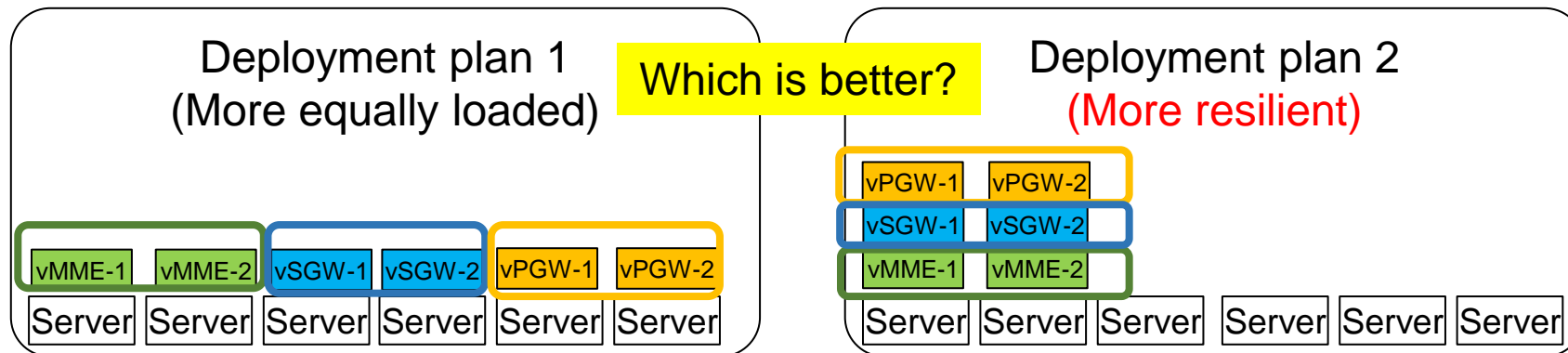
- For discussion in next version of I-D
- Optimal location of pool elements
 - optimize resource allocation depending on operator's objective
 - Service continuity condition should be taken into account, if needed.
- Resource Sharing Policy
 - Support both of dedicated and shared servers in multiple tenant environments.
 - Support mixture of dedicated and shared servers in a pool.
 - Relocation of pool elements due to policy change.
 - Relocation of pool elements without service interruption.

Optimal location of pool elements

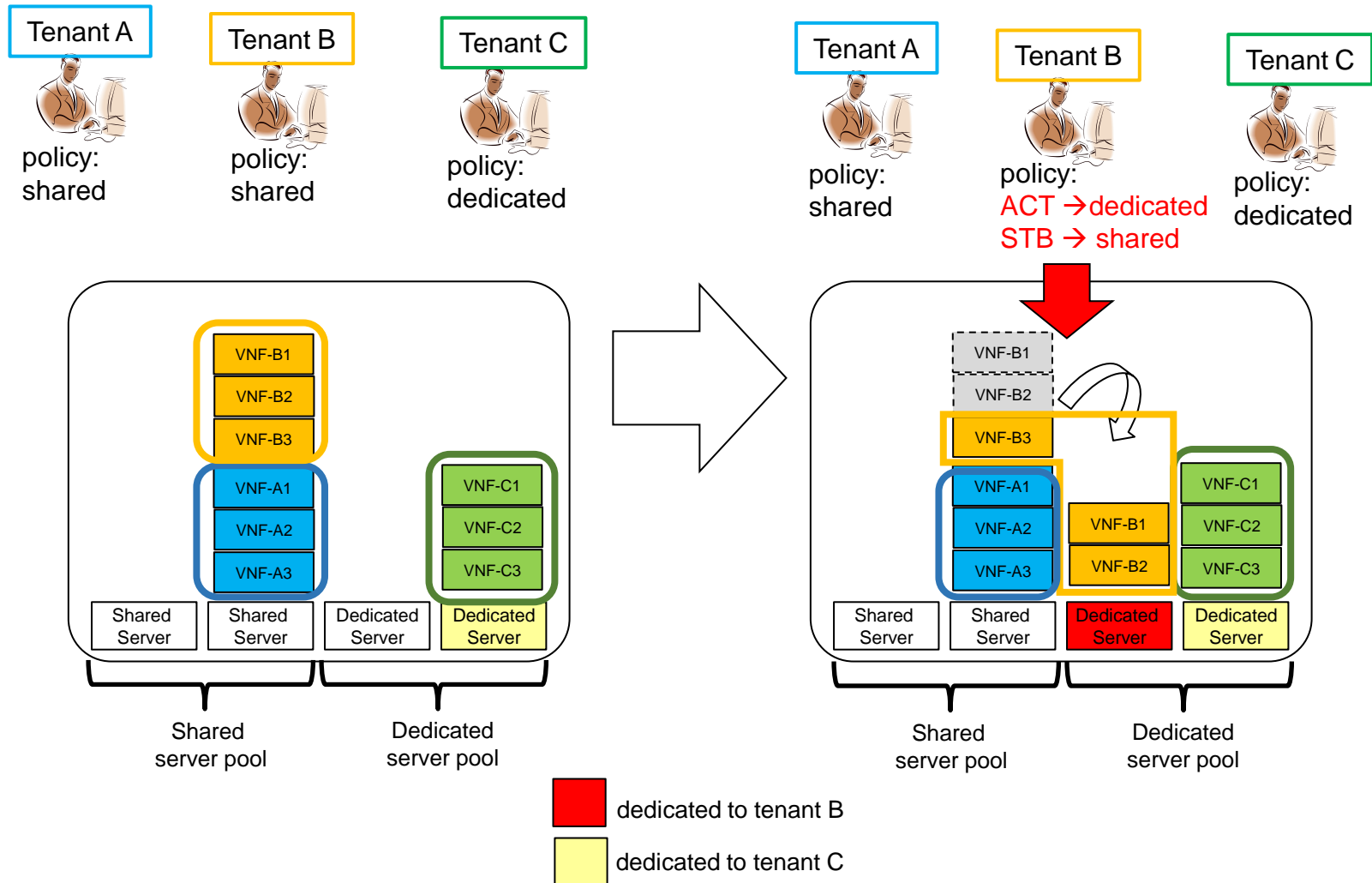
- A service is provided by 3 types of VNFs, each of which has its own VNF pool.
 - A VNF Pool for each function type
- The service is available if each pool has at least one element alive.



The infrastructure consists of 6 physical servers, each of which randomly fails.
The user's objective is to maximize the resiliency of the service.



Resource Sharing Policy



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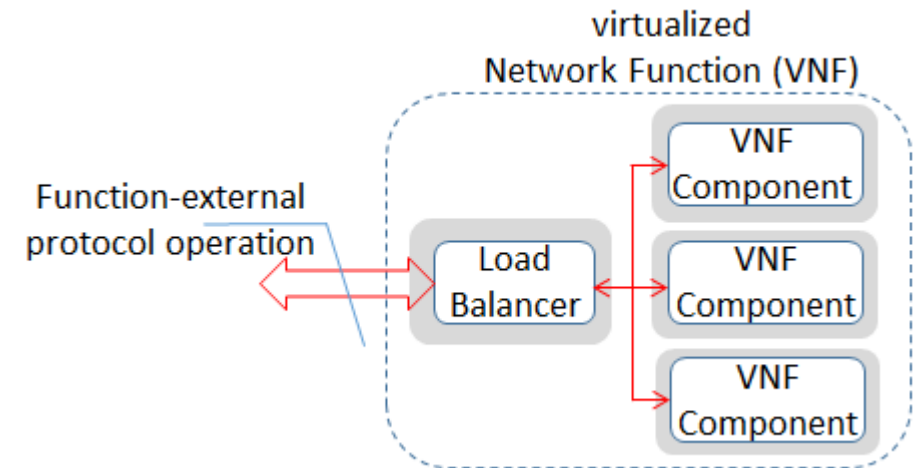
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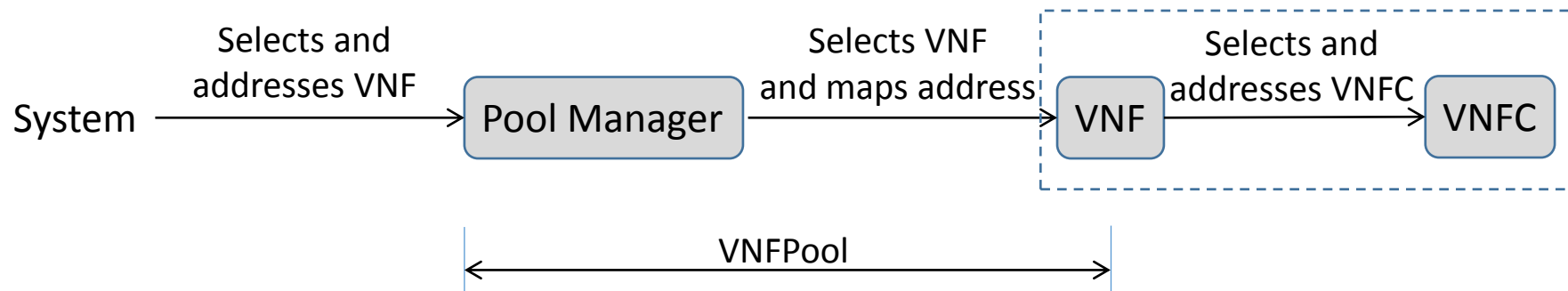
Updates since IETF 89 – General

- Alignment to converged terminology, definition and operational scope
 - Virtualized Network Function (VNF)
 - Self-contained function
 - No consideration of VNF-internals (load balancing between and scaling of VNFCs, redundancy management, failure handling)
 - VNF Pool, VNF Pool Element, VNF Set
 - VNF Pool Manager, Service Control Entity
- Service requirements and recommendation of design objectives
 - Scaling, load balancing and addressing
 - Failure handling



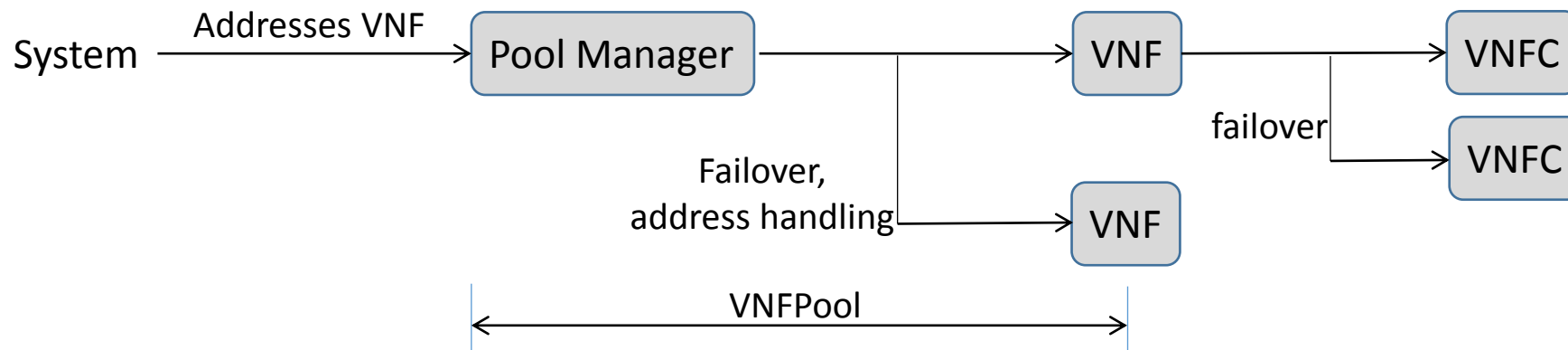
Updates since IETF 89 – Scaling

- Scaling and load balancing
 - Balance load between VNFs within a VNF Pool
 - Inter-working with system-wide load balancing
 - Cellular-specific selection of VNFs
- Compatibility with system-wide addressing of selected VNFs
 - VNFPool may consider different addressing scheme → Address mapping
- Coordination of VNFs within a VNF Pool and external representation to the system



Updates since IETF 89 – Failover

- Instantiation and installation of redundant resources on VNF-level
- Policing and enforcement of different redundancy schemes
 - Active/Standby synchronization, backup VNF
- Co-existence of VNF-internal (active/standby VNFC) and VNF-external redundancy management
- Failover between VNFs within a Pool
- Handling of Pool-internal addressing and identification in case of failover



Virtualization of Content Distribution Network

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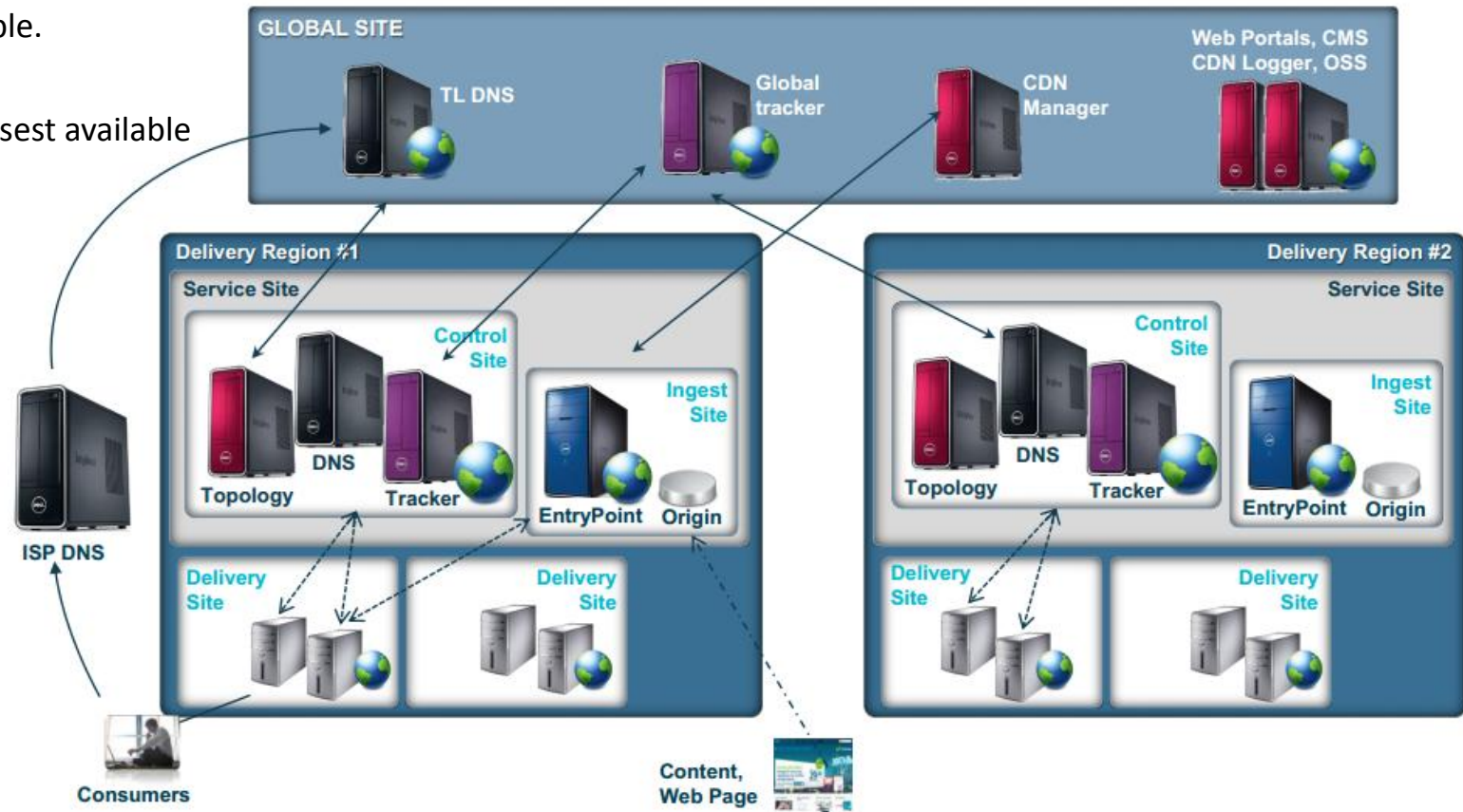
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- Design principles require a reliable and responsive CDN
 - Fault-tolerant network with appropriate load balancing
 - Performance of a CDN is typically characterized by the response time (i.e. latency) perceived by the end-users
 - Slow response time is the single greatest contributor to users abandoning content and web sites and processes
 - The reliability and performance of a CDN is affected by
 - Distributed content location
 - Switching mechanism
 - Data replication and caching strategies
 - Reliable functions and network connectivity

draft-aranda-vnfpool-cdn-use-case-00

Functional Components of the CDN

- Content Distribution Management
 - Deploy content as close to each user as possible.
- Content Routing
 - Route the users request for content to the closest available content store or content engine.
- Content Switching & Load Balancing
 - Distribute user requests across one or multiple servers.
- Surrogate servers
 - Mirrored web content servers
- Content Proxies
 - Master proxy
 - Cache proxy
- Content DNS servers
- GeoIP information servers
- Content Peering Gateways



draft-aranda-vnfpool-cdn-use-case-00

- Requirements for vCDN component behavior and capability
 - VNF Pool selection per component type
 - Selection and load balancing across VNF instances within the VNF Pool
 - Coordination of scale-out and scale-in of vCDN components within a VNF Pool
 - Coordination of the use, visibility and addressability of additional VNF resources
 - Function-specific redundancy and failover management
 - Selection of appropriate commodity hardware for backup and failover
 - vCDN component resource monitoring and health checking
 - Detection of failure, type and level
 - Isolation and reporting of failures
 - Failover to another VNF instance within the VNF Pool
 - Transparency to other VNF instances