Integration of NFV with Distributed Orchestration into a WMN-based Disaster Network

23. ITG Fachtagung Mobilkommunikation (MKT'18)

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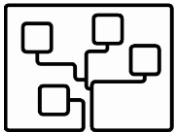

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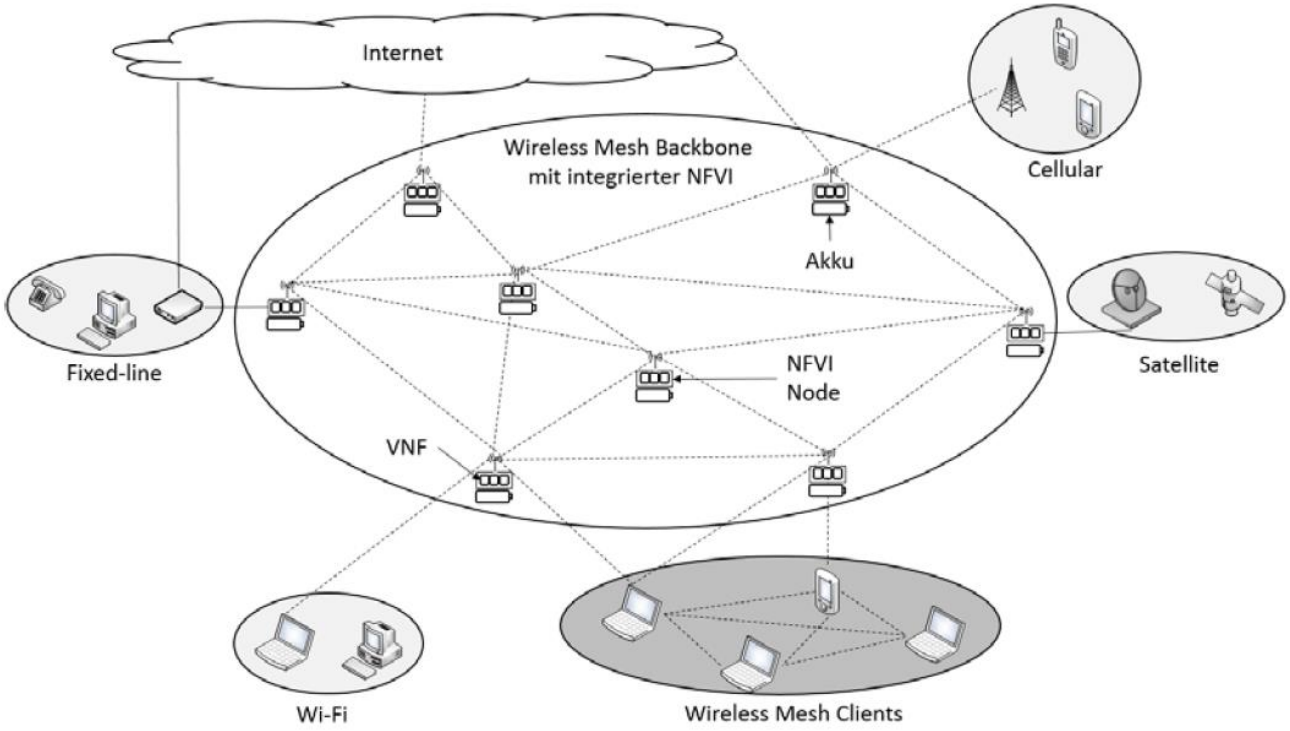
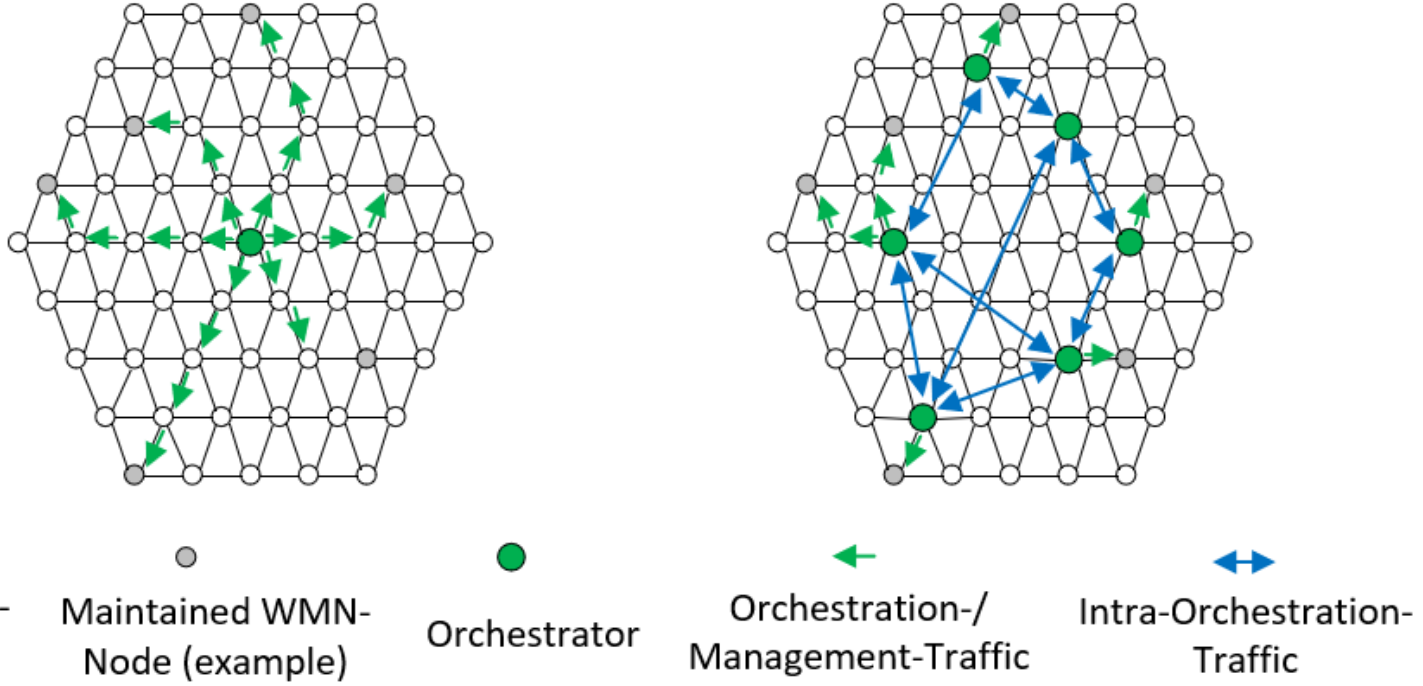
1 Introduction 1

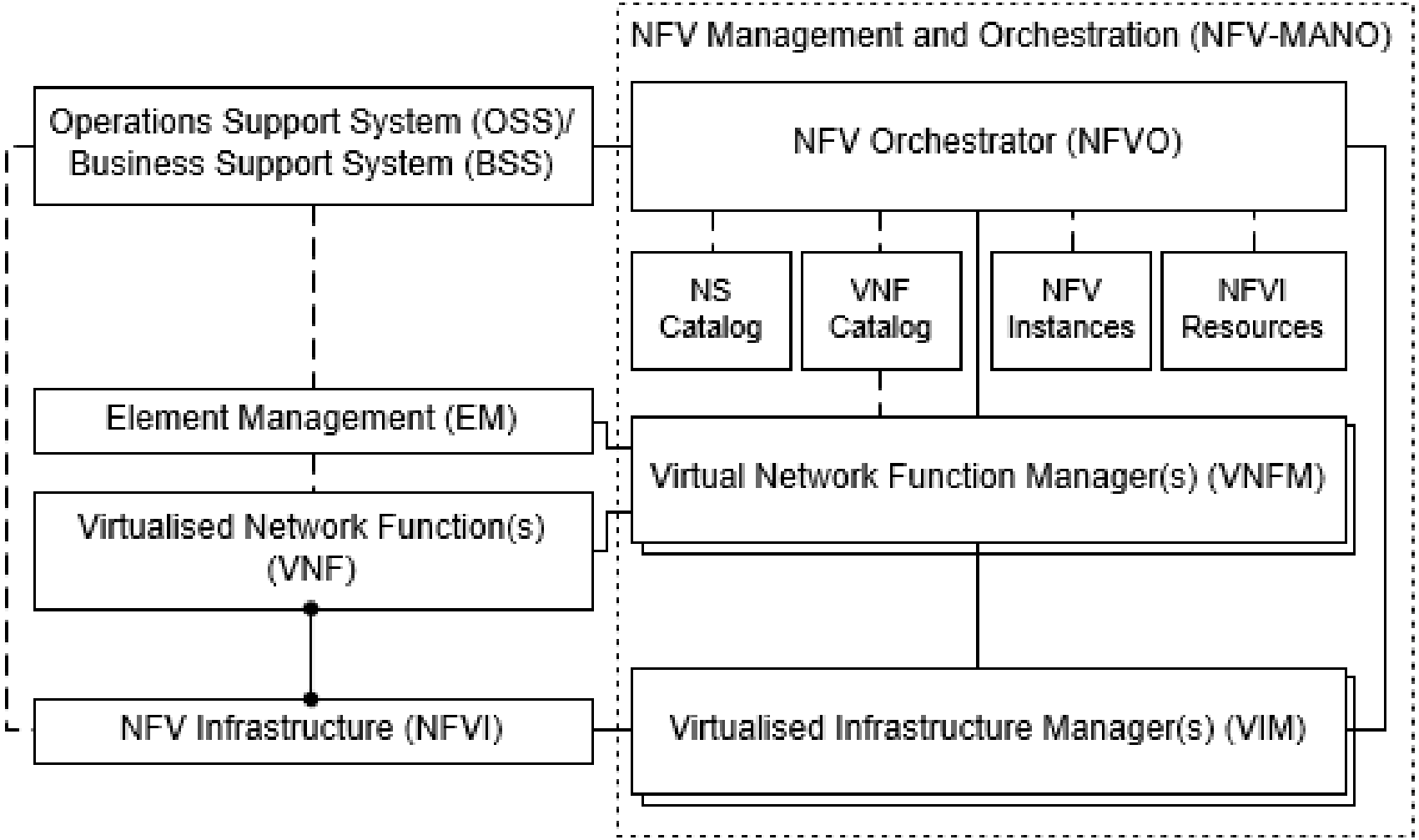
- **Existing communication infrastructures often destroyed after natural and/or man-made disasters**
- **Wireless Mesh Network (WMN) for establishing a disaster network**
- **Integration and utilization of network function virtualisation (NFV) in the WMN for the optimization of various aspects**



- **Crucial aspect: required centralized NFV orchestrator is a possible single point of failure**
- **Loss of centralized NFV orchestrator results in complete breakdown of the NFV infrastructure (NFVI) as resources can not be maintained and orchestrated anymore**
- **Distributing the functionality of the NFV orchestrator among the WMN-Nodes to realise reliability and availability of the NFVI**



2 ETSI's Network Function Virtualisation Management and Orchestration



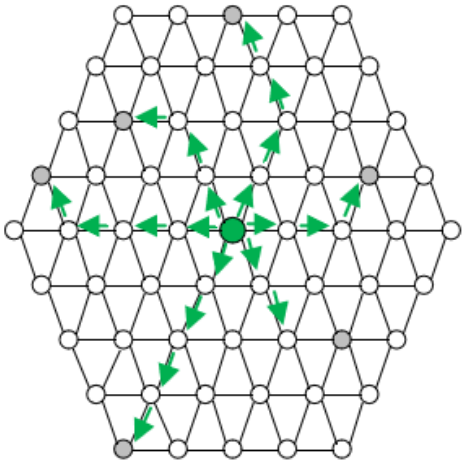
3 Requirements for a Distributed NFV Orchestration in a WMN-based Disaster Network

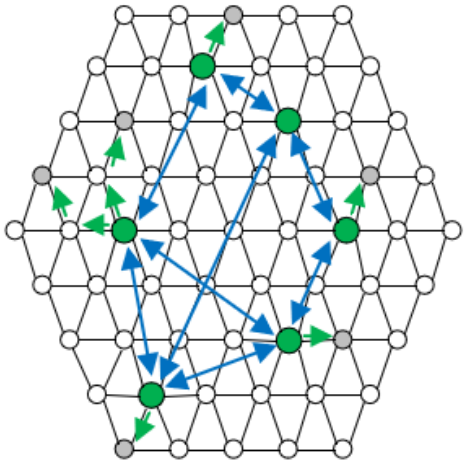
Architecture specific requirements:

- **Distributed and decentralised**
- **Light-weight communication**
- **Adaptability/flexibility**
- **Robust/fault-tolerant**
- **Secure against violators**

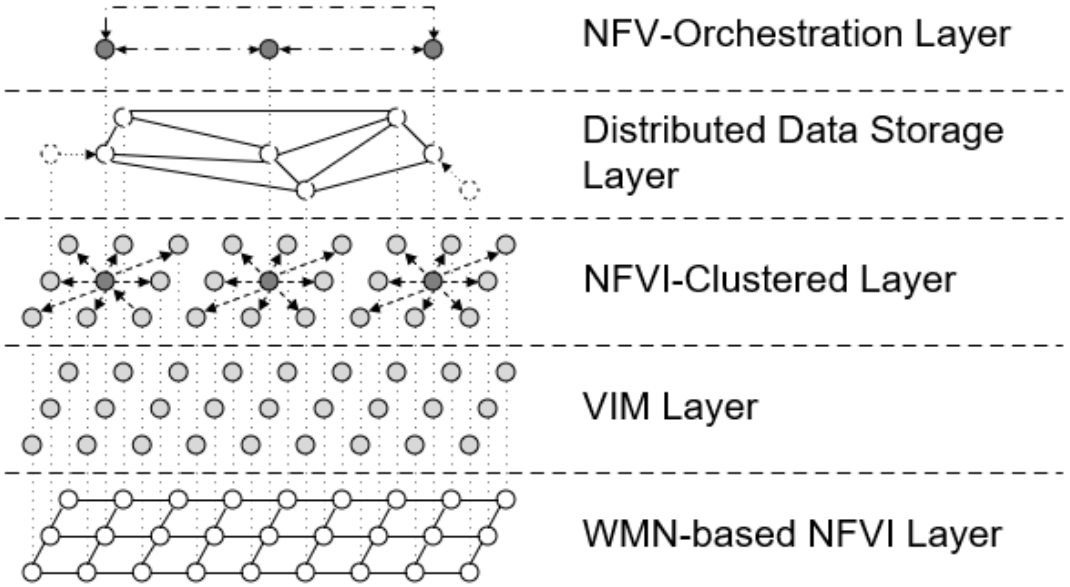
Resource- and Network Service-Orchestration specific requirements:

- **Wireless connection awareness**
- **Continuous resource awareness**
- **Energy-efficient resource allocation**
- **Autonomous deployment of network services**





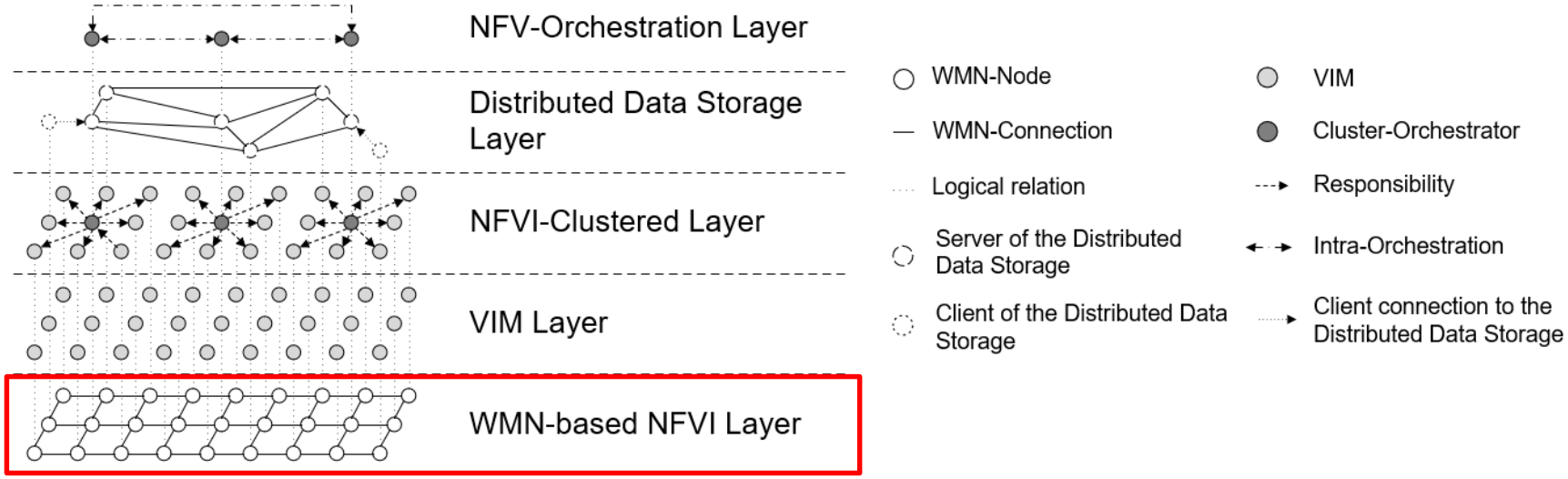
4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 1



4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 2

WMN-based NFVI Layer:

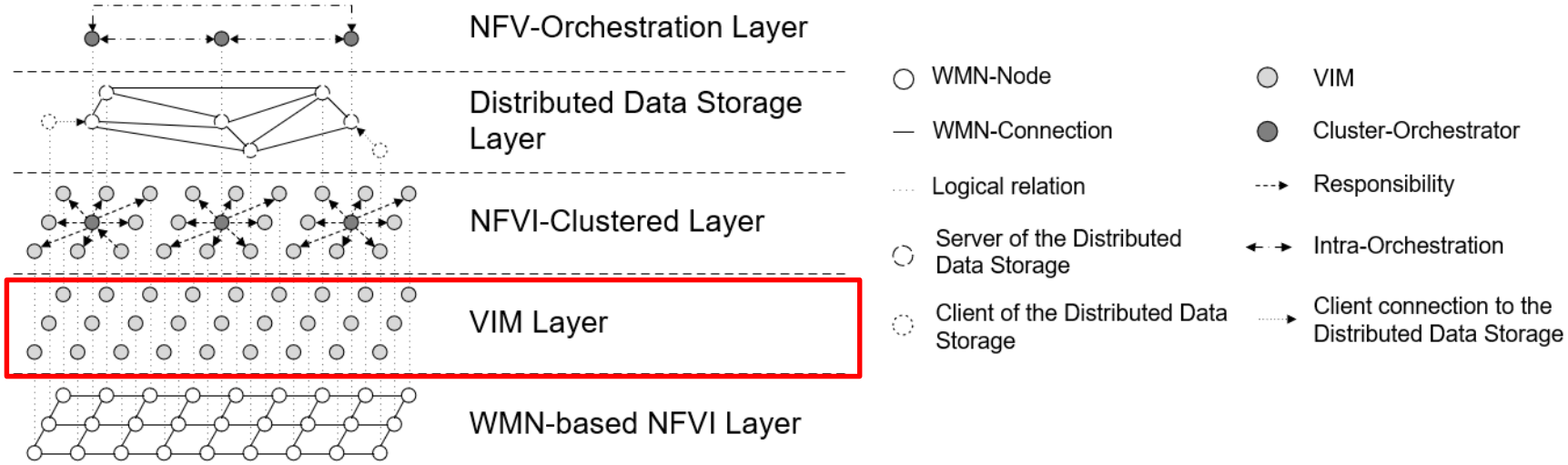
- **Consists of the actual outdoor-routers realising the WMN**
- **Providing hardware and virtualization layer to the NFVI**
- **Interface for retrieving relevant information**



4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 3

VIM Layer:

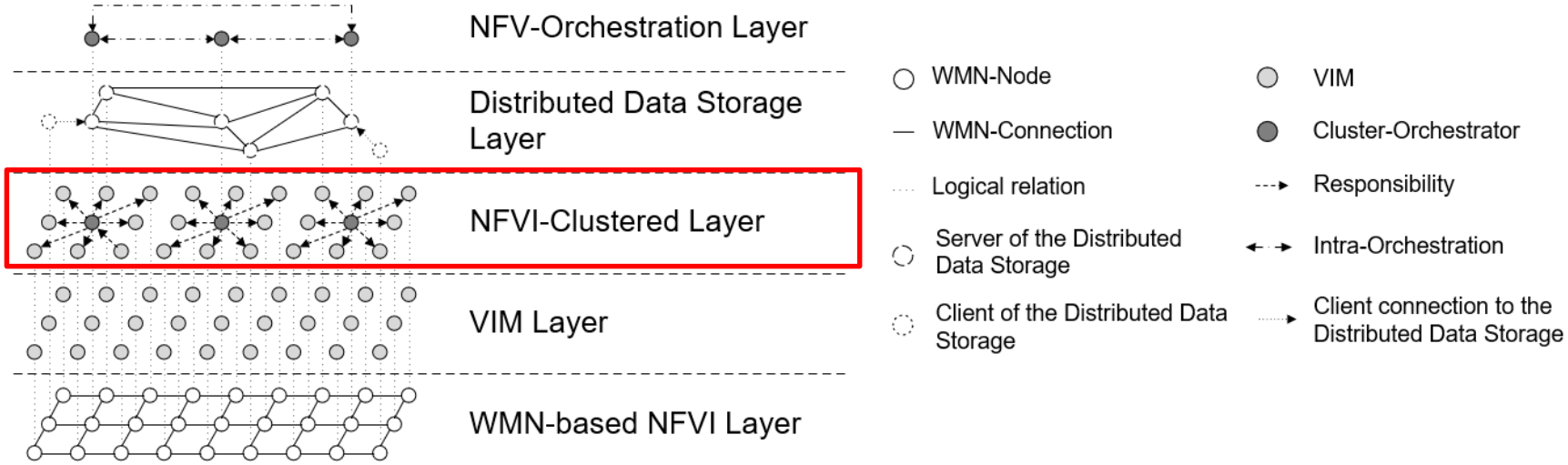
- **Monitoring and managing local hardware and virtualisation-layer**
- **Interface for orchestrator for the allocation and observation of resources**



4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 4

NFVI-Clustered Layer

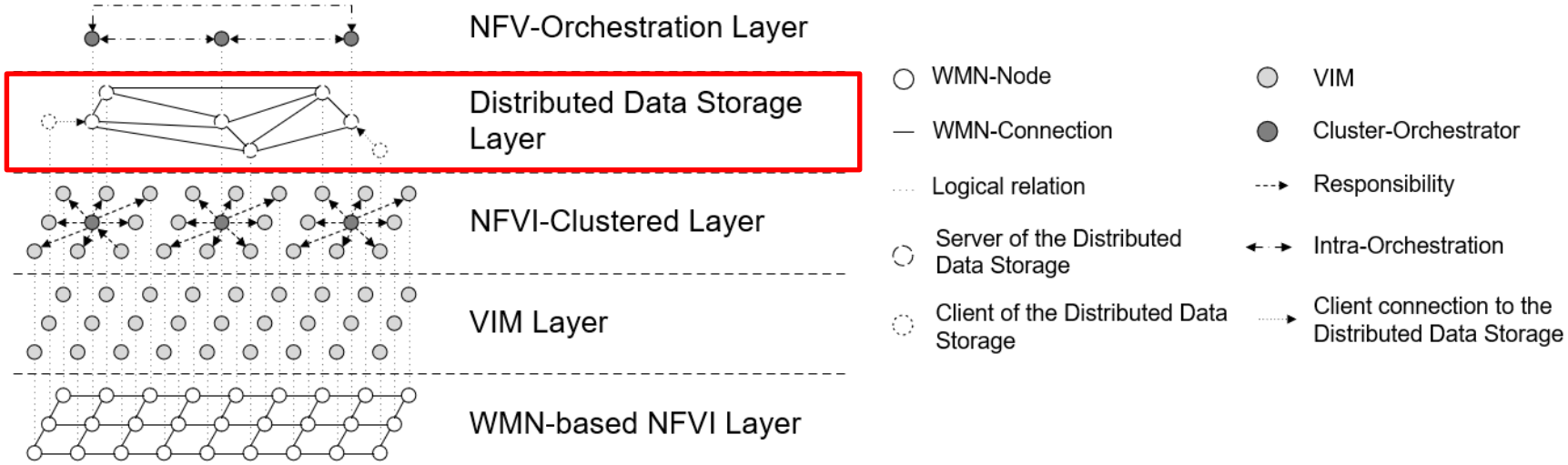
- **Consists of logical clusters on top of the VIM Layer**
- **Each cluster defines the area of responsibility for a Cluster-Orchestrator**
- **New nodes will be connected to their locally nearest cluster**
- **Significantly responsible for the adaptability and flexibility**



4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 5

Distributed Data Storage Layer:

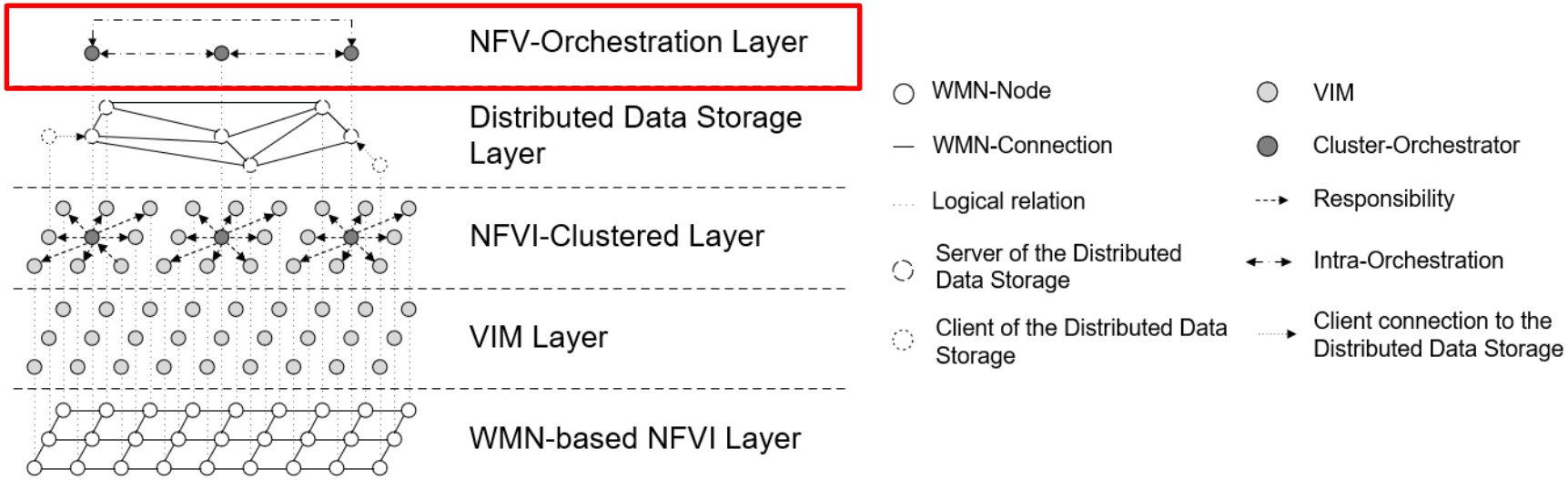
- **Realised by the Cluster-Orchestrators and an additional Backup-Node**
- **Provides the possibility to store and save data in a reliable manner**
- **Cluster-Orchestrators store the current NFV configuration and WMN connections of their cluster**



4 Architecture of a Distributed NFV Orchestrator for a WMN-based Disaster Network 6

NFV-Orchestration Layer:

- **Used for the intra-orchestration communication**
- **Event-driven communication dealing with the cluster-wide coordination:**
  - **Global NFV orchestration**
  - **Management of the NFVI-Clustered Layer**



5 Conclusion

- **Examined the integration of NFV with distributed orchestration into a WMN-based Disaster Network**
- **Requirements for the distributed NFV orchestration**
- **Proposed an architecture for a distributed NFV orchestration consisting of logical clusters on top of the WMN**
- **Architecture consisting of five logical layers with each fulfilling a certain functionality**

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