

Future Internet Standards Workshop

ISO/IEC JTC1/SC6 Future Network Working Group 7 – Part 7: Service Composition

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Introduction



- Future Internet
 - Future of the Internet
- Future Network(s)
 - Network(s) of the Future
 - Term used in Standardization Body such as JTC 1/SC 6, ITU-T Focus Group-FN, ITU-T SG 13
 - ISO/IEC JTC1/SC6: Future Network
 - ITU-T FG-FN and SG 13: Future Networks
- Relevant Activities
 - USA: GENI, FIND
 - EU/FP7: FIRE, FIA
 - Japan: AKARI
 - Korea: Future Internet, Future Network



Introduction



- ISO/IEC JTC 1: “Information Technology”
- JTC 1/SC 6 : “Telecommunications and Information Exchange between Systems”
 - WG 7 – **Services** and protocols in the network and transport layers
 - Including Architecture, Upper Layers and Applications related issues

Std. No.	Title	Editors
29181-1	Overall aspects	M. K. Shin, J. Alcober
29181-2	Naming and Addressing	J. Xie, K. Zhang, H.K. Kahng
29181-3	Switching and Routing	J. Grant, H.K. Kahng
29181-4	Mobility	S.J. Koh, M. Roshanaei
29181-5	Security	H. Wang, Y. Liu (Acting)
29181-6	Media Transport	Francisco Iglesias, Sung Hei Kim, Xavier Miguelez
29181-7	Service Composition	Alberto J. Gonzalez, Jong-Hwa Yi, Ramon Marin de Pozuelo
29181-8	Federation	Myung-Ki Shin



History of FN standardization in SC6 on Service Composition

- **SC 6/WG 7, September 2010 (London, UK) – Plenary Meeting**
 - Project Subdivision of ISO/IEC 29181
 - 7 Multi-part document structure: 29181-1 ~ 7
 - 1: Overall Aspects
 - 2: Naming and Addressing
 - 3: Switching and Routing
 - 4: Mobility
 - 5: Security
 - 6: Media Transport
 - 7: **Service Composition**
 - Approved PDTR 29181-1, Future Network : Problem Statement and Requirements – Part 1: Overall aspects
 - Defines Service Composition as a general requirement for the Future Network (subclause 9.7)
 - Service Composition enablers are included as milestones for standardization of the Future Network



History of FN standardization in SC6 on Service Composition

- **SC 6/WG 7, February 2011 (London, UK) – Interim Meeting**
 - Developed updated WD texts of 29181-2(Naming and Addressing), 29181-3(Switching and Routing)
 - **First WD** texts of 29181-6(Media Transport), **29181-7(Service Composition)**
 - Initial proposal on new work on Federation of FN

- **SC 6/WG 7, June 2011 San Diego, USA) – Plenary Meeting**
 - Developed **updated WD** texts of 29181-2(Naming and Addressing), 29181-6(Media Transport), **29181-7(Service Composition)**
 - First WD text of 29181-4(Mobility), 29181-5(Security)
 - Approved new 29181-8(Federation) part and first WD text



History of FN standardization in SC6 on Service Composition



- **SC 6/WG 7, September 2011 (Barcelona, Spain) – Interim Meeting**
 - Developed **updated WD** texts of 29181-2(Naming and Addressing), 29181-6(Media Transport), **29181-7(Service Composition)**, 29182-4 (Mobility) and 29181-5(Security)



History of FN standardization in SC6 on Service Composition

- Current version

Std. No.	Title	Status
29181-7	FNPSR Part 7: Service Composition	3rd WD



Next Step

- Text for consideration in next plenary meeting (February 2012, China)

JTC 1/SC 6's Considerations in FN Service Composition

- **FN identified the high-level requirement of service composition**
 - PDTR 29181-1: Overall Aspects
 - The FN should be **customizable** in accordance with various users and service **requirements**.
 - Service composition can be defined as the composition of those activities required to **combine** and link existing **services** (**atomic** and, even **composite** services) to create new processes; i. e., the customizability of the services provided to the end users.

- **Main goal of TR 29181-7: Service Composition**
 - Describes the problem statement and requirements for FN from the perspective of service composition



JTC 1/SC 6's Considerations in FN Service Composition



■ Service composition

- “Service composition is the technology that supports the composition of those activities required to **reuse** and **combine existing services** to create **new services**. This technology provides a natural way of combining existing services including also composite services. Such kind of recursive composition is one of the most attractive and challengeable features of the service composition, allowing to rapidly and easily create new services. Thus, the service composition provides benefits on improved **usability of existing services, faster time for service creation and reduced time to market for new services.** “
- Services must be **self-contained** and **platform-agnostic** computational elements → metadata, semantics, ontologies (information/service-centric approach)
- One important characteristic is that they can be **flexibly** and **dynamically** composed and **reused** to create complex service-based applications

JTC 1/SC 6's Considerations in FN Service Composition

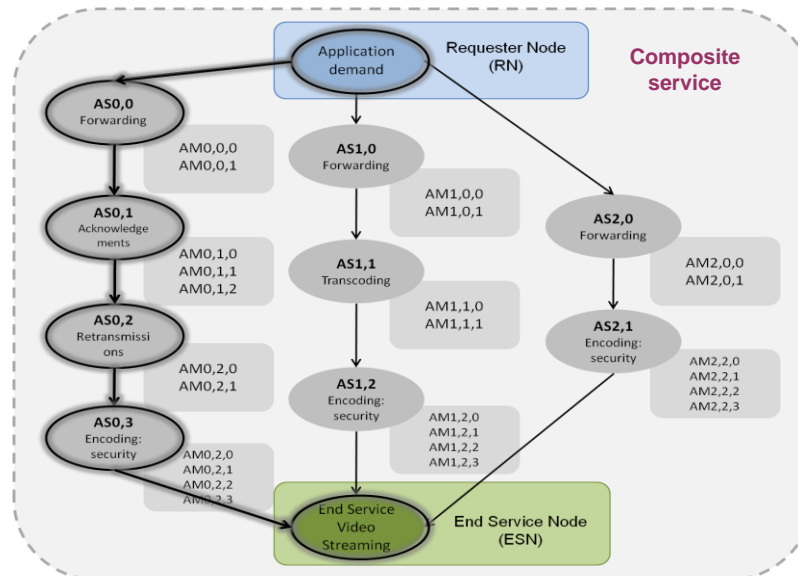
■ Service composition

- The service composition feature of FN can provide the users and applications with highly heterogeneous services.
- The main purposes are
 - 1) to provide **customized** services based on the user and service **requirements** and their **context**.
 - 2) to provide **reusability** of the existing component services for service providers not to devise every component in services
 - 3) to **adapt** the composed services to the changes of **context** or any other environmental factors, for example, by replacing overloaded component service with another one → **context-awareness**

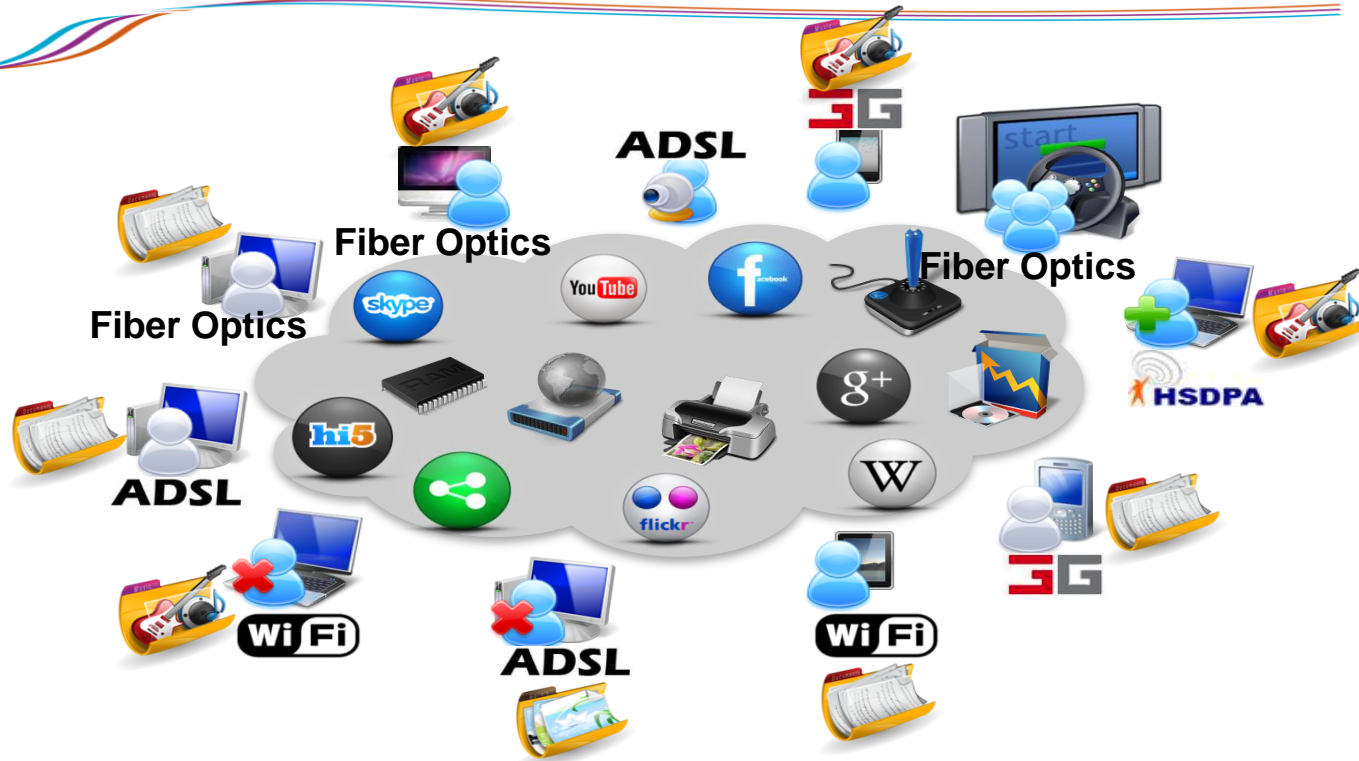
JTC 1/SC 6's Considerations in FN Service Composition

Service-oriented framework based on:

- Atomic Services (AS):** are those individual functions or roles commonly used in networking protocols (i.e. acknowledgments, sequence numbers, flow control, etc). These are well-defined and self-contained functions, used to establish communications for consuming composite services.
- Atomic Mechanisms (AM) :** are specific implementations, which provide the desired atomic mechanism functionality.
- Composite Services (CS):** A composite service is a service that is composed of more than one atomic service. The composite service logic needs to be specified in a workflow to describe the composition and execution process.



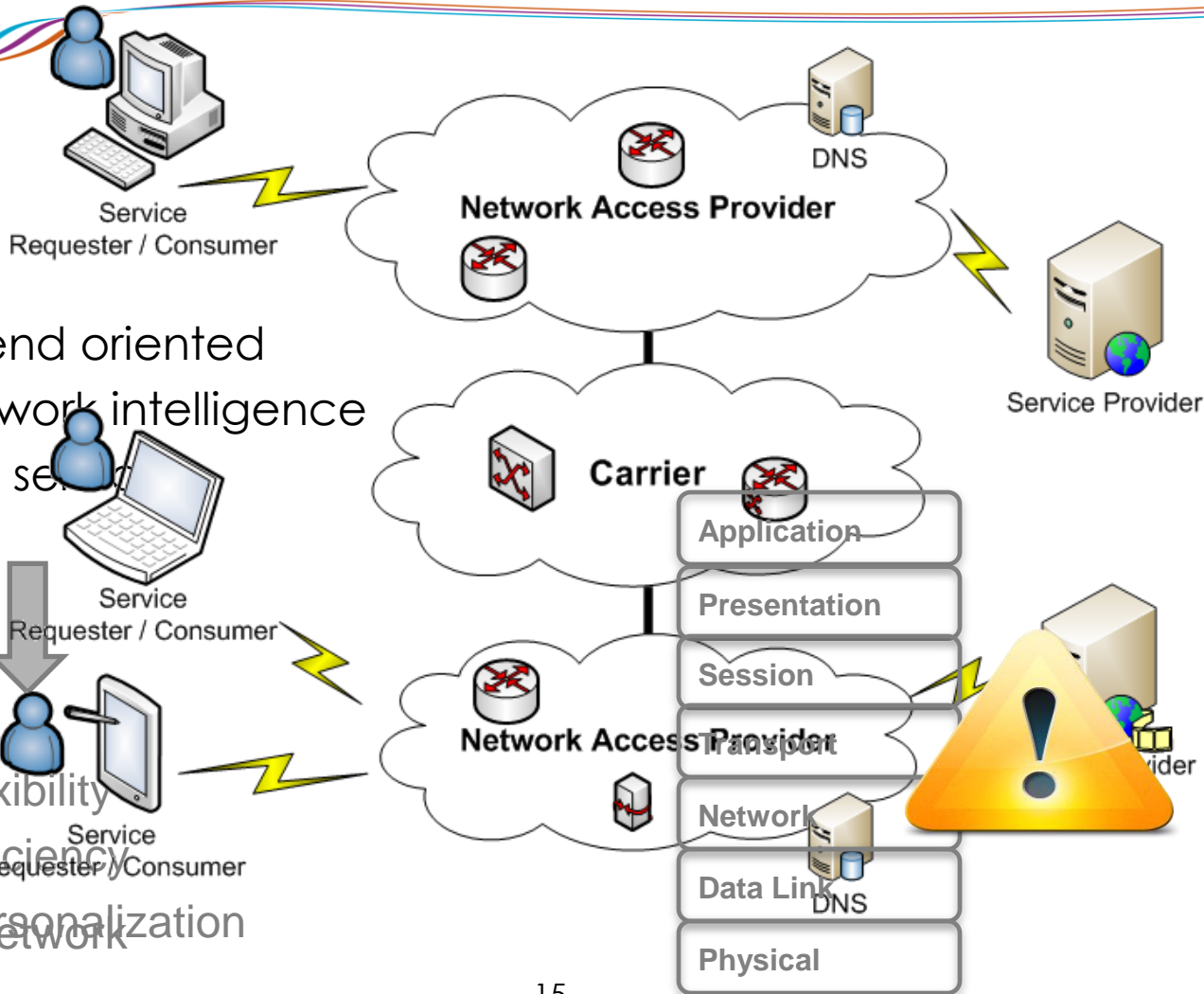
JTC 1/SC 6's Considerations in FN Service Composition



Current Internet

- Appearance of new services and applications
 - Introduce new requirements
- Services give value to networks
- Network does not provide seamless access to services

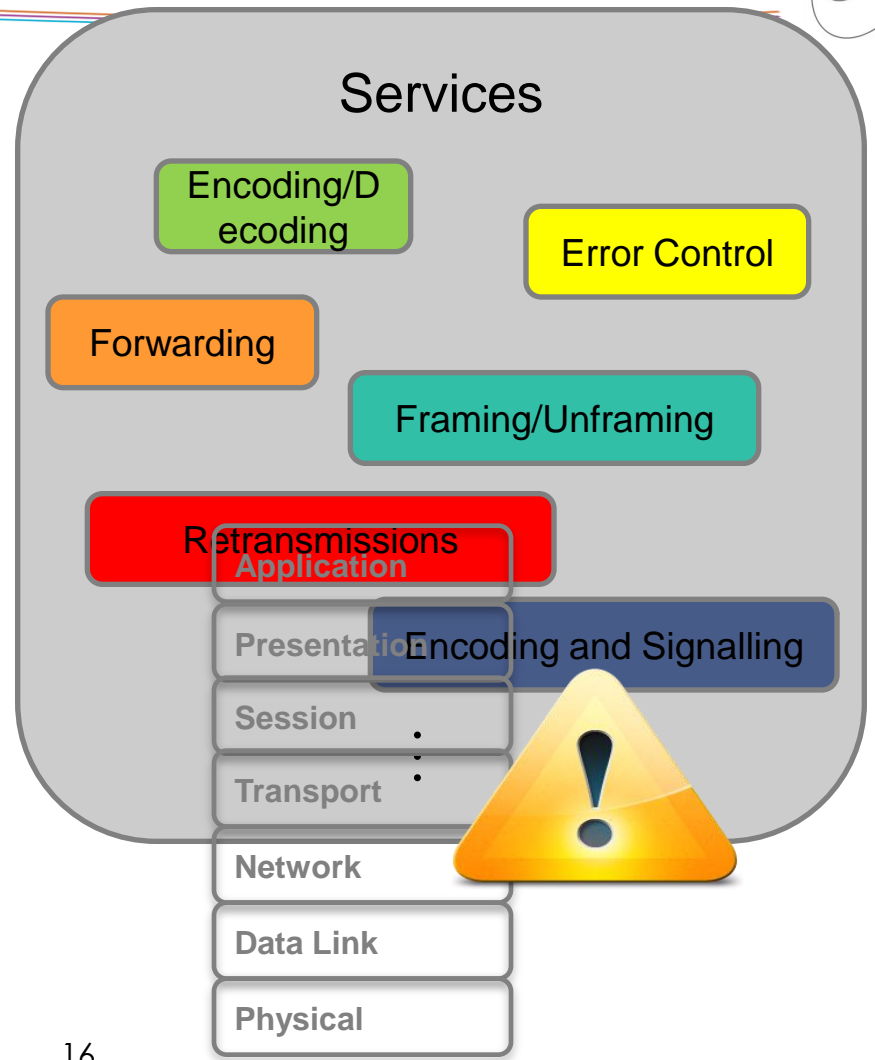
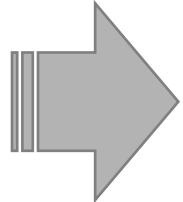
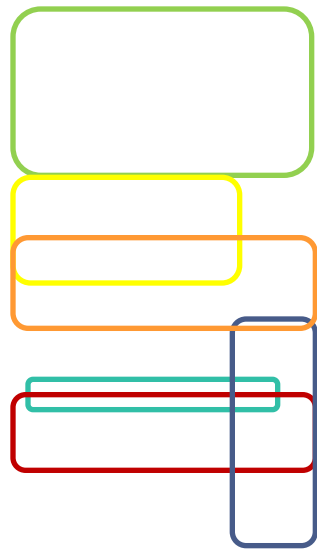
JTC 1/SC 6's Considerations in FN Service Composition



- End-to-end oriented
- Low network intelligence
- General service

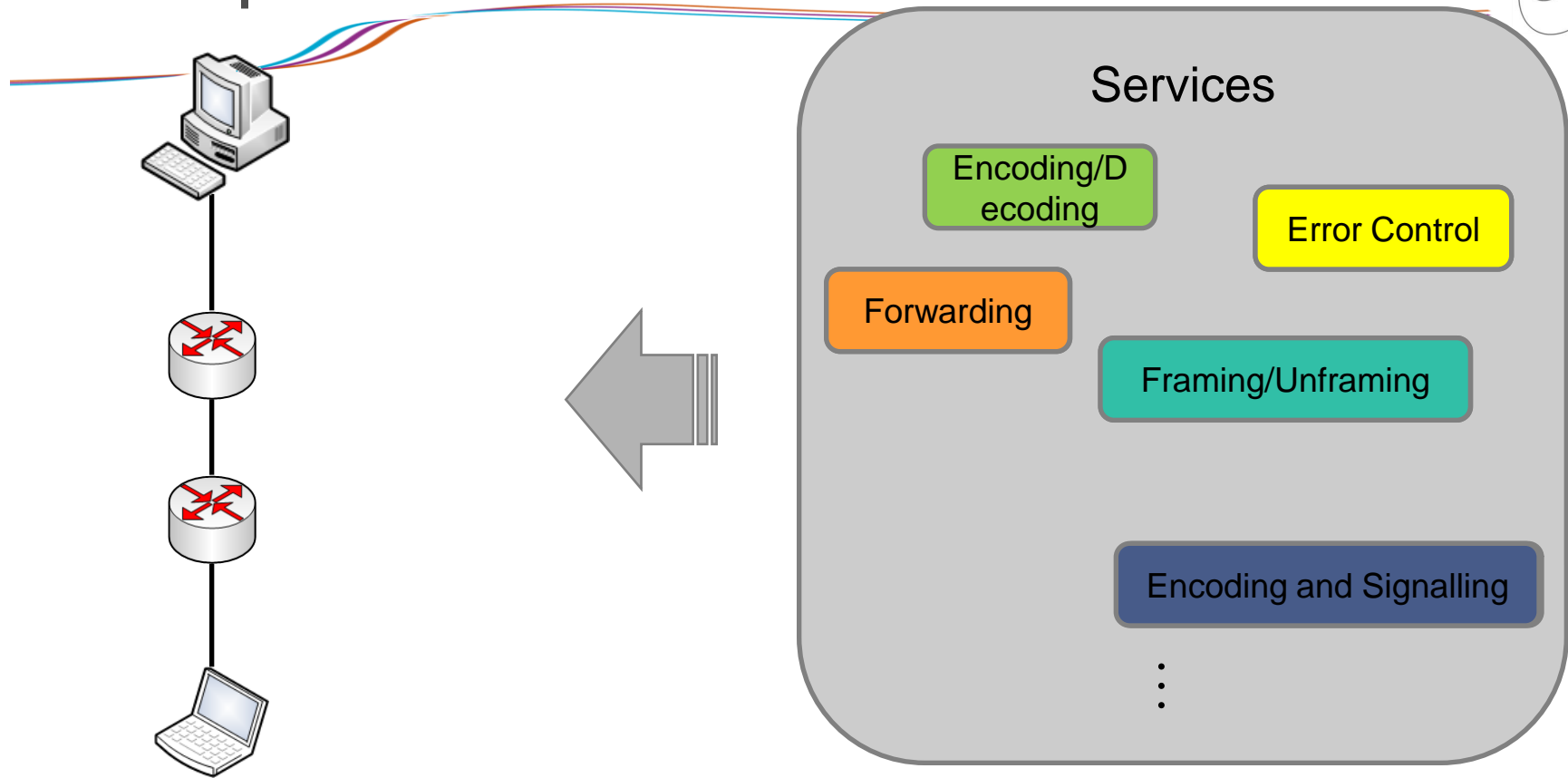
- Less flexibility
 - Less efficiency
 - Less personalization
- Current network

JTC 1/SC 6's Considerations in FN Service Composition



- Identification of services

JTC 1/SC 6's Considerations in FN Service Composition



- Composing services for each communication

JTC 1/SC 6's Considerations in FN Service Composition



- **What is the Future Network view for Service Composition?**
 - There are many existing specifications and solutions
 - SOA technology, OMA OSE, TMF SDF, IEEE NGSON, ITU-T SG13, etc.
 - Many SOA products such as IBM, Oracle, HP, etc
 - It's important to analyze various problems of the current service composition solutions and try to resolve those problems
 - One consideration is to address existing service composition solutions using FN technologies
- **Our view is focused on**
 - How current service composition solutions can be optimally used to address FN environment
 - What are additional requirements of FN users (different stakeholders)
 - Key element for guiding FN development (evolutionary approaches and revolutionary)

JTC 1/SC 6's Considerations in FN Service Composition



■ Challenges

■ **Dynamic service composition**

- Services can be specified at run time in dynamic service composition. It means that the capabilities of the service can be extended dynamically, allowing runtime re-composition, decomposition of services, and dynamic adaptation in case of changes in context (services and resources) involved in composite services

■ **Context-awareness in service composition**

- FN should support the context management to provide customized and context based services. Thus, different kind of context including user, device, service, resource, and network can be used for discovering, selecting, allocating and composing services to participate in the composition process.

■ **Requester empowerment in service choice and routing**

- Service requester should have more control over the contents/service that wants to consume. This control must be reflected in flexible routing and service selection according to requester's service definition. Consequently, FN must build a network architecture that provides more intelligence to the network-side whilst still leaving decision-making processes at the end-points.

■ **Semantic searches oriented to service/resource**

- FN must be focused on a service/data-centric approach that allows executing the search of services and resources based on the requester requirements. This implies that future network must be able to create, discover, negotiate and consume composite services in a flexible and context-aware way.

JTC 1/SC 6's Considerations in FN Service Composition



■ Challenges

■ Resources and services identification

- Every flow over the network must be routed based on its requirements. Therefore, each flow must be identified in order for nodes along the route to cooperate and negotiate autonomously, for guaranteeing the minimum QoS parameters of it.

■ Environmental heterogeneity

- Heterogeneity of nodes, networks and services add another level of complexity to service composition process. If instances of a service are executed in nodes with different capabilities and network access links, every service instance should be evaluated individually, and attributes of a specific one could not be applied to one of another node.

■ Attribute acquisition

- Composition process should be based on the attributes of the services (and their concrete implementation), but extract the complete and updated information of a service is extremely difficult. It should require a previous empiric process extracting information about how the inclusion of a service or another affects in terms of delay, error rate, and each QoS parameter that are relevant for a complete solution (the whole chain of services from requester to end service provider).

■ Service Validation

- Service composition should be validated to guarantee consistency and reliability of services in FN in such a way that it does not hamper the entire process of service composition and heterogeneity of FN. Each service needs to be validated its correctness and consistency before registering itself with FN and composition. Services and composition process must be defined and described with languages based on formal semantics.

Current status: problem statement and requirements

■ 29181-7, FNPSR - Part 7: Service Composition

■ Scope

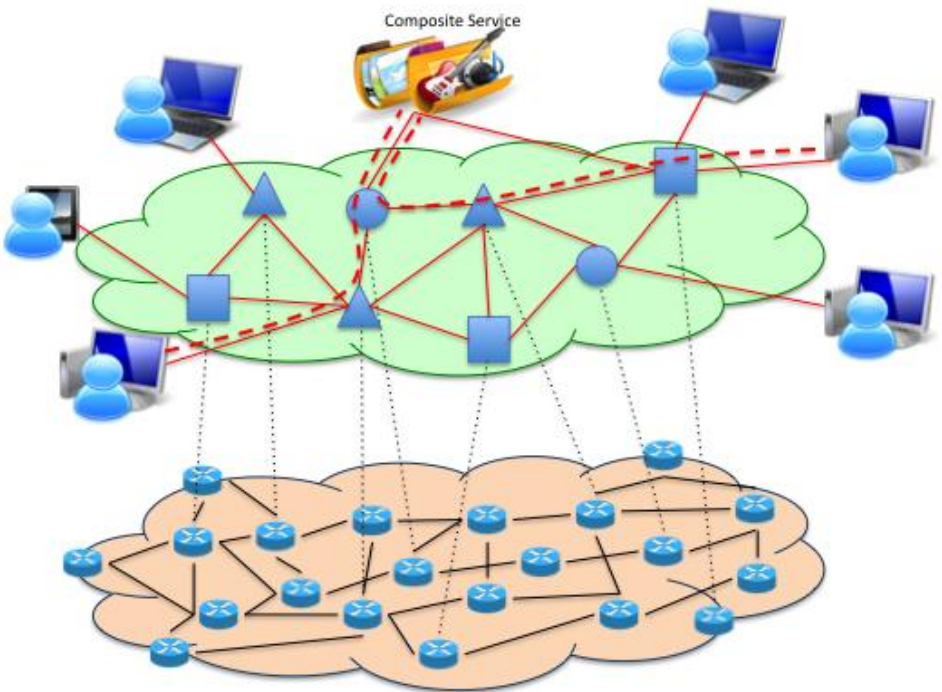
- Describes the problem statement, requirements and a service-oriented functional architecture for the FN from the perspective of service composition
 - Analyze and classify problems of the current solutions on the service composition
 - Study various on-going standardization and research activities related to service composition
 - Identify requirements on the service composition for the FN
 - Describe some technical aspects of the service composition for the FN
 - Describe use cases to support different features of the service composition
 - Propose a Service-oriented functional architecture including functional blocks and basic service composition mechanisms for the FN

Current status: problem statement and requirements

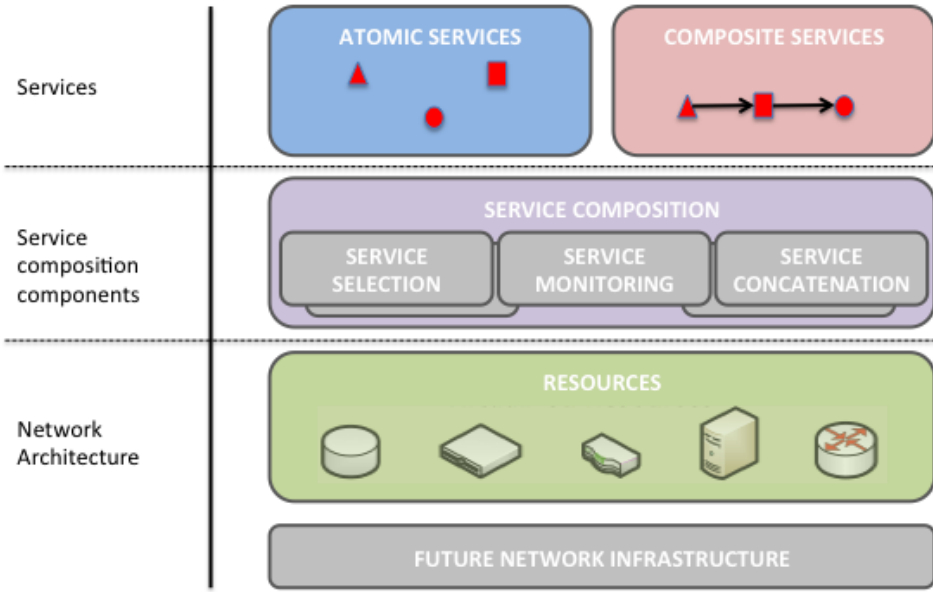
- Document parts overview
 - Problem Statement
 - Related standardization and research activities
 - Requirements of service composition for the FN
 - General requirements
 - Specific requirements
 - Technical aspects of service composition
 - Functional Blocks of Service Composition in FN
 - Use Cases
 - Service-composition within a single node
 - Service-composition between two nodes
 - Dynamic service-adaptation

Current status: problem statement and requirements

- Conceptual architecture of service composition

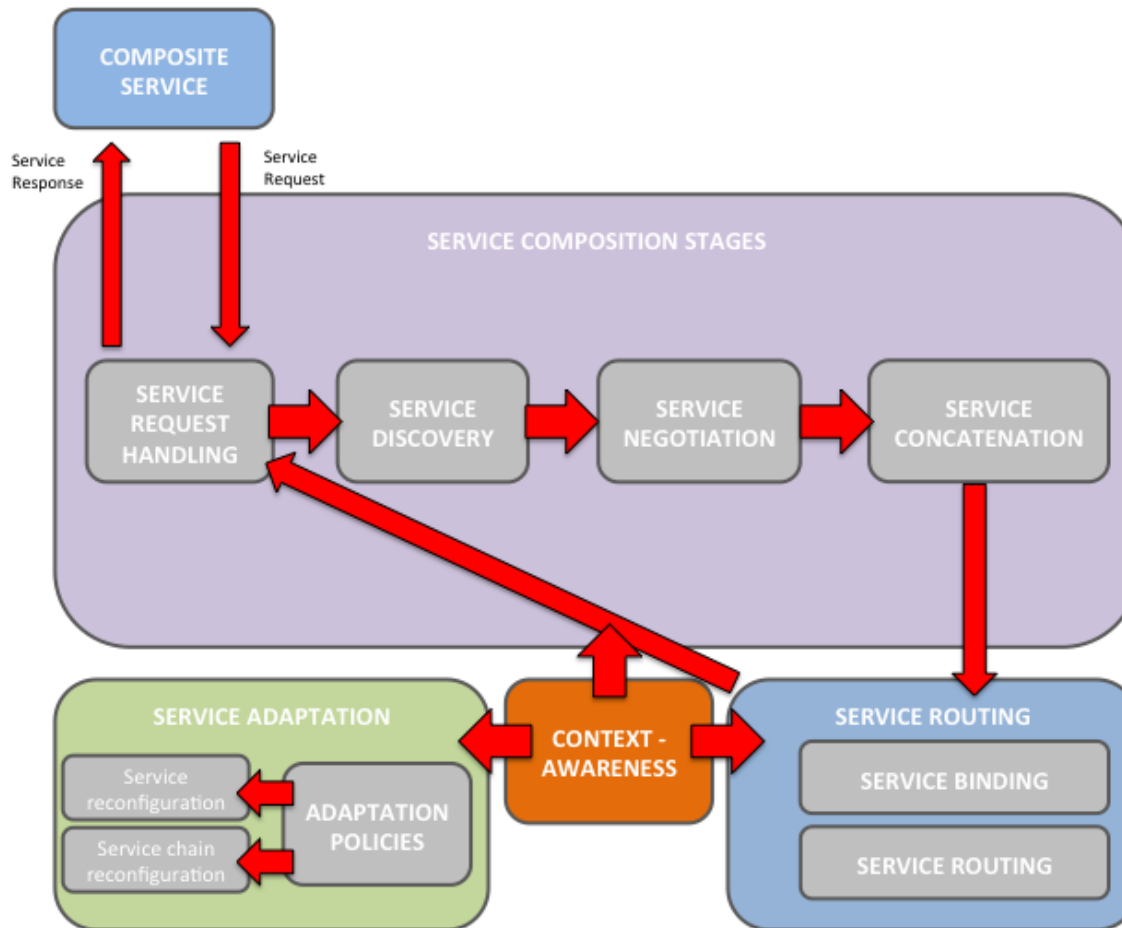


Future Network Node
 Services / Functionalities
 Provisioning path



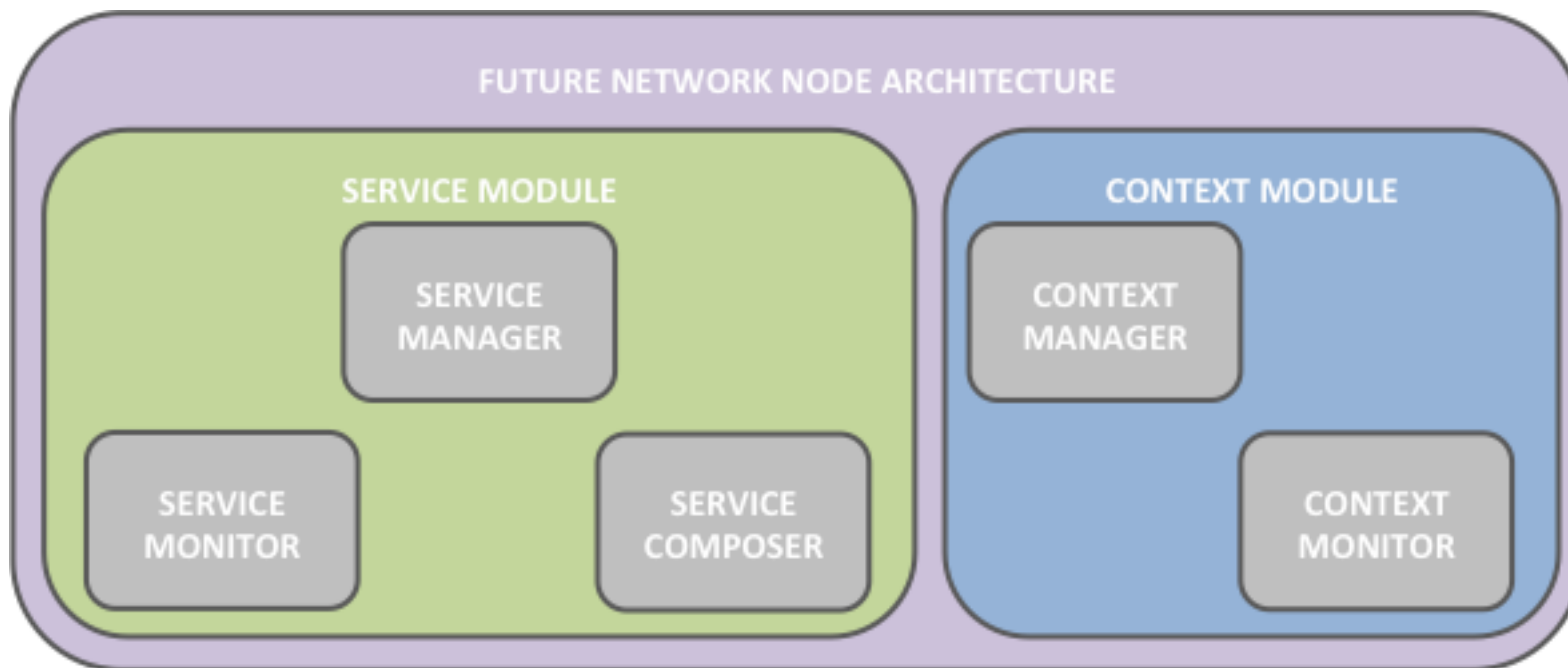
Current status: problem statement and requirements

- Service Composition Functional Blocks



Current status: problem statement and requirements

- Service Composition Architecture Components



Conclusion

- Activity started in Barcelona (Spain) January 2010
- Formally approved in London (UK) September 2010
- Current work in progress: TR 29181-7 Service composition: Problem statement and requirements
 - 3rd Working draft (Barcelona, Spain, September 2011)
- Key for enabling FN evolution
 - Enables FN backward compatibility
 - Can be deployed from higher levels to lower levels (evolutionary and revolutionary)



Thank you!

감사

Q&A



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