Service Oriented Networking

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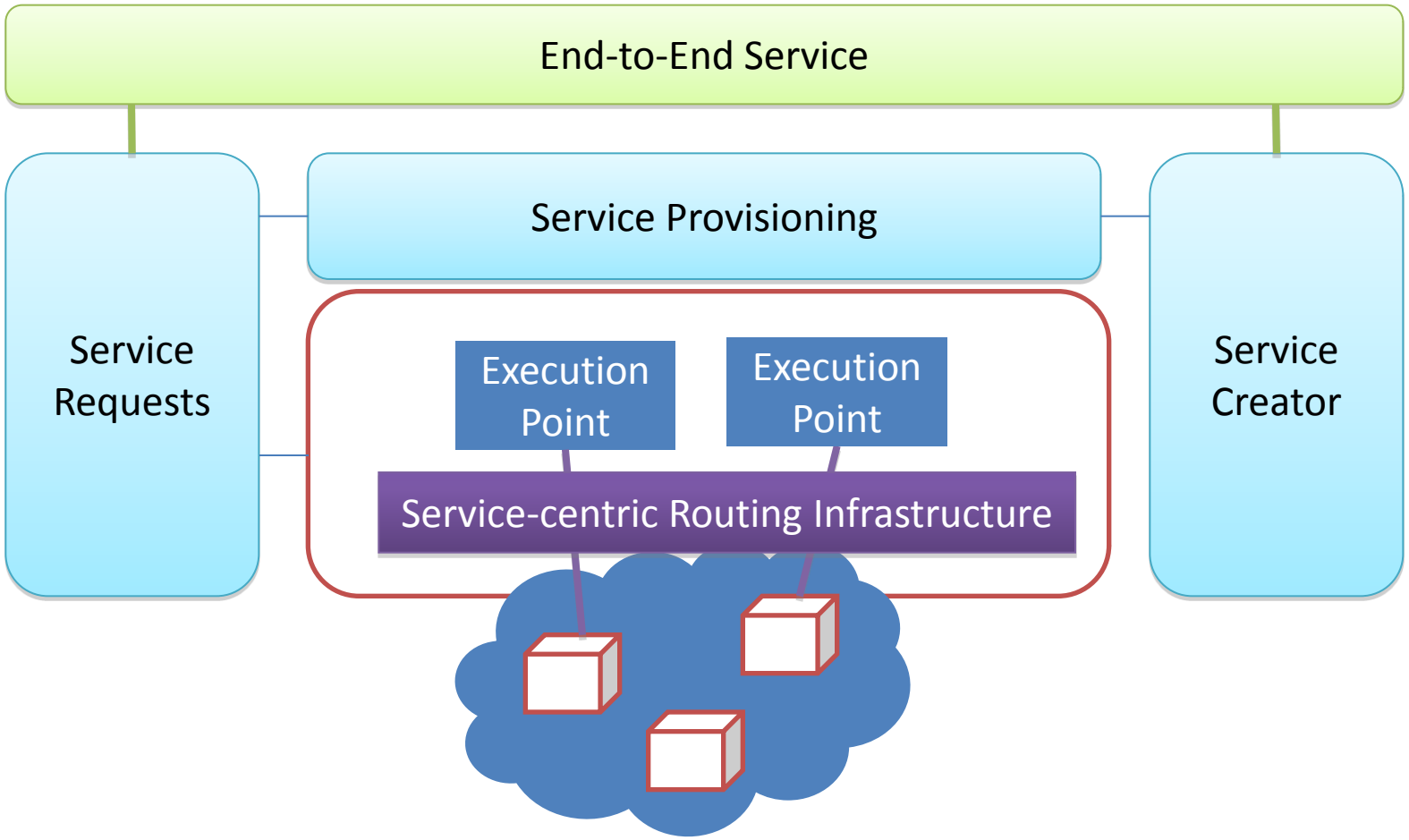
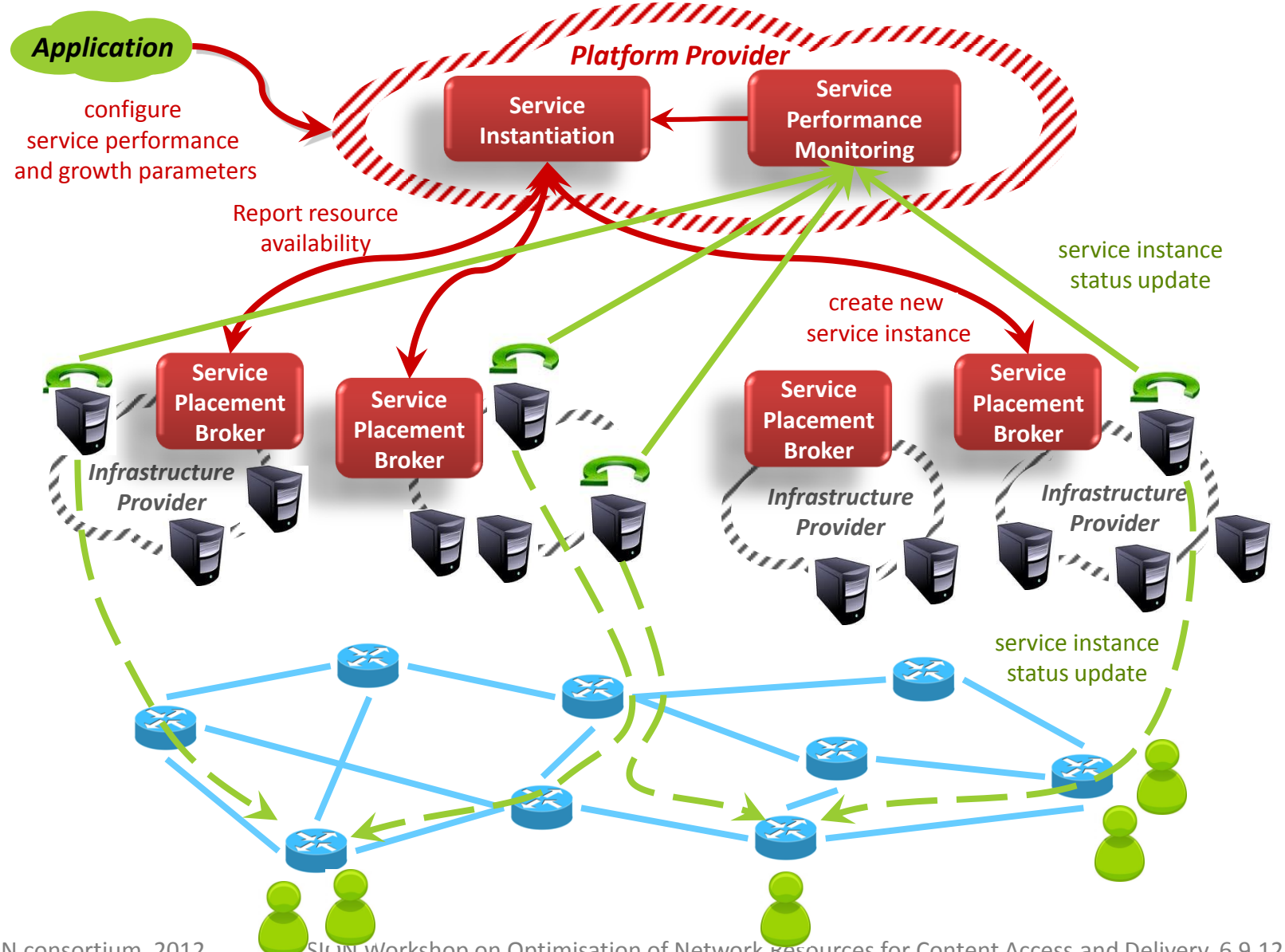
Service Oriented Networking – problem space

- Media applications are not stand-alone
- Cloud storage and applications are limited and unsuitable for dynamic, real-time, high-bandwidth applications
  - Granularity
  - Localisation
  - Configurability
- CDNs are fine for distributing static content efficiently
- ICN takes CDNs a stage further with fine grained caching
- Neither are suitable for deploying and accessing service processing capabilities
- FUSION is studying *Service Oriented Networking*
  - Optimise provisioning of service components
  - Native network protocols for service access and routing
  - Interworking between service and network layers.

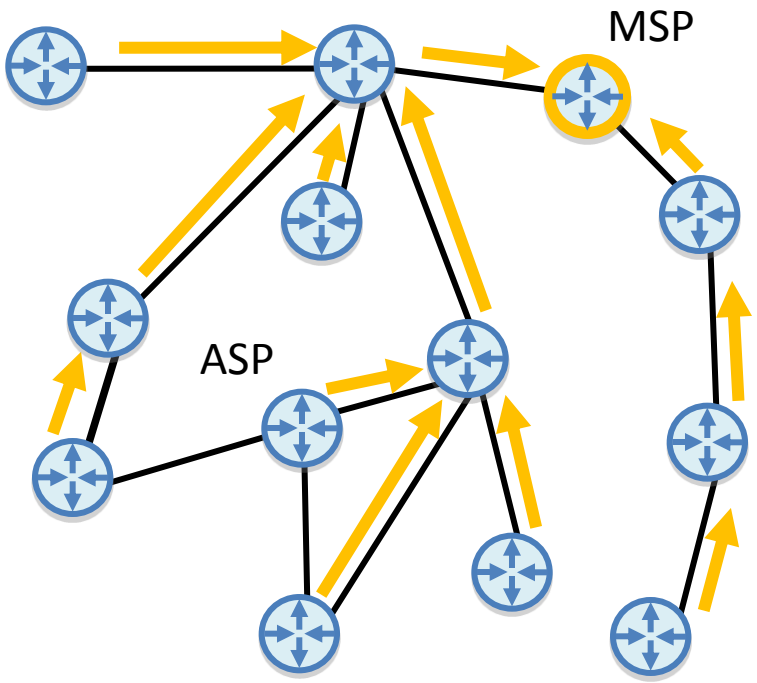
Service Oriented Networking high-level view



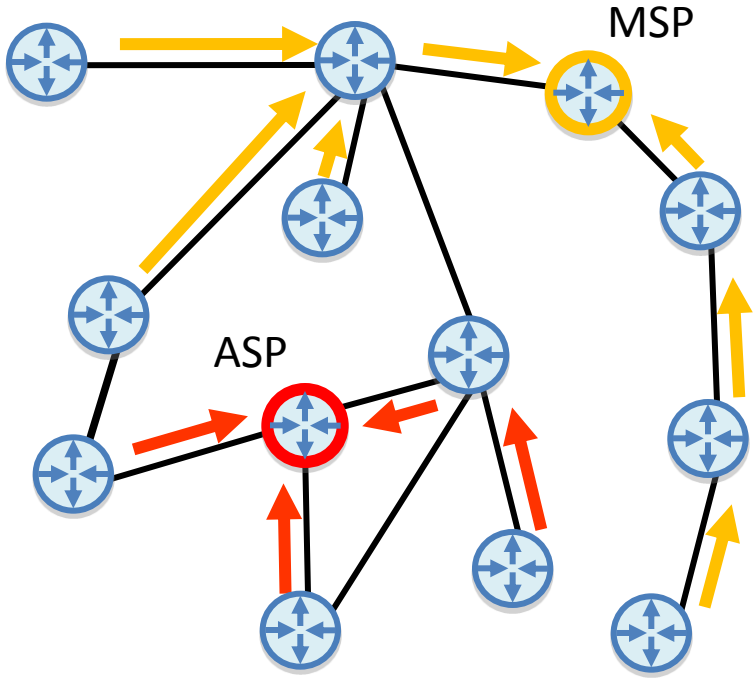
FUSION service deployment and dynamic configuration



Service-aware networking example



Before Hotspot Detection



After Hotspot Detection

MSP/ASP: Main/Alternative Service Process

Tangible objective 1

- Define a combined service and network architecture that exploits the synergies between both for delivering a new class of decentralised, high-bandwidth-and-processing, real-time applications.
  - Distributed processing elements outside of the tightly controlled environments typical of current data centres
  - Dynamic service instantiation according to user demands including flash crowds, service urgency and interactivity
  - Scalable service naming scheme for both the network and service management layers
  - Migration path from current cloud architectures.
- Verifiable metrics:
  - The scalability of the end-to-end solution with respect to dynamically growing or shrinking service demand patterns and number of services

Tangible objective 2

- Provide new network protocols operating on both the network and service layers for demanding applications:
  - A routing protocol that selects the best available instance for a user session
  - Compact service-routing protocols
  - Efficient registration and aggregation of service instance status updates distributed over the network
- Verifiable metrics:
  - Accuracy of selecting optimal service instances
  - Routing overhead and stretch
  - Load dispersion across multiple instances of the same component
  - Amount of service data that needs to be maintained according to the frequency and quantity of routing updates.

Tangible objective 3

- Develop techniques and algorithms for a service platform to deploy and execute complex and personalised services:
  - Service description and orchestration language that is able to define an application in terms of service components and interactions
  - Intelligent service placement algorithms for optimal service instantiation mapped to available network and computation resources
  - Lightweight, container-based resource isolation techniques for heterogeneous hardware systems.
- Verifiable metrics:
  - Number of parameters and functions to define personalised services
  - Network/service performance metrics delivered by service instances at the selected locations
  - Overhead (memory, CPU load, etc.) of the selected lightweight virtualisation techniques
  - Time to establish and tear-down service instances.

Expected impact

- Service-aware networking, combining deployment, execution, dynamic instantiation, routing, load-balancing will result in:
  - Highly demanding networked applications (gaming, personalised video, public safety…) to be deployed in a scalable and cost-efficient manner
  - Improved performance, reduced cost, improving flexibility and efficiency
  - Increased access for users, application and service providers
  - Increased involvement of ISPs in application provisioning, recouping revenue lost to OTT services

Partners

- University College London, UK
- Alcatel-Lucent Bell NV, Belgium
- Telekomunikacja Polska S.A., Poland
- Spinor GmbH, Germany
- Interdisciplinary Institute for Broadband Technology, Belgium

Fusion