



Flexible Universal Networks - a new approach to telecommunication services?



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Agenda

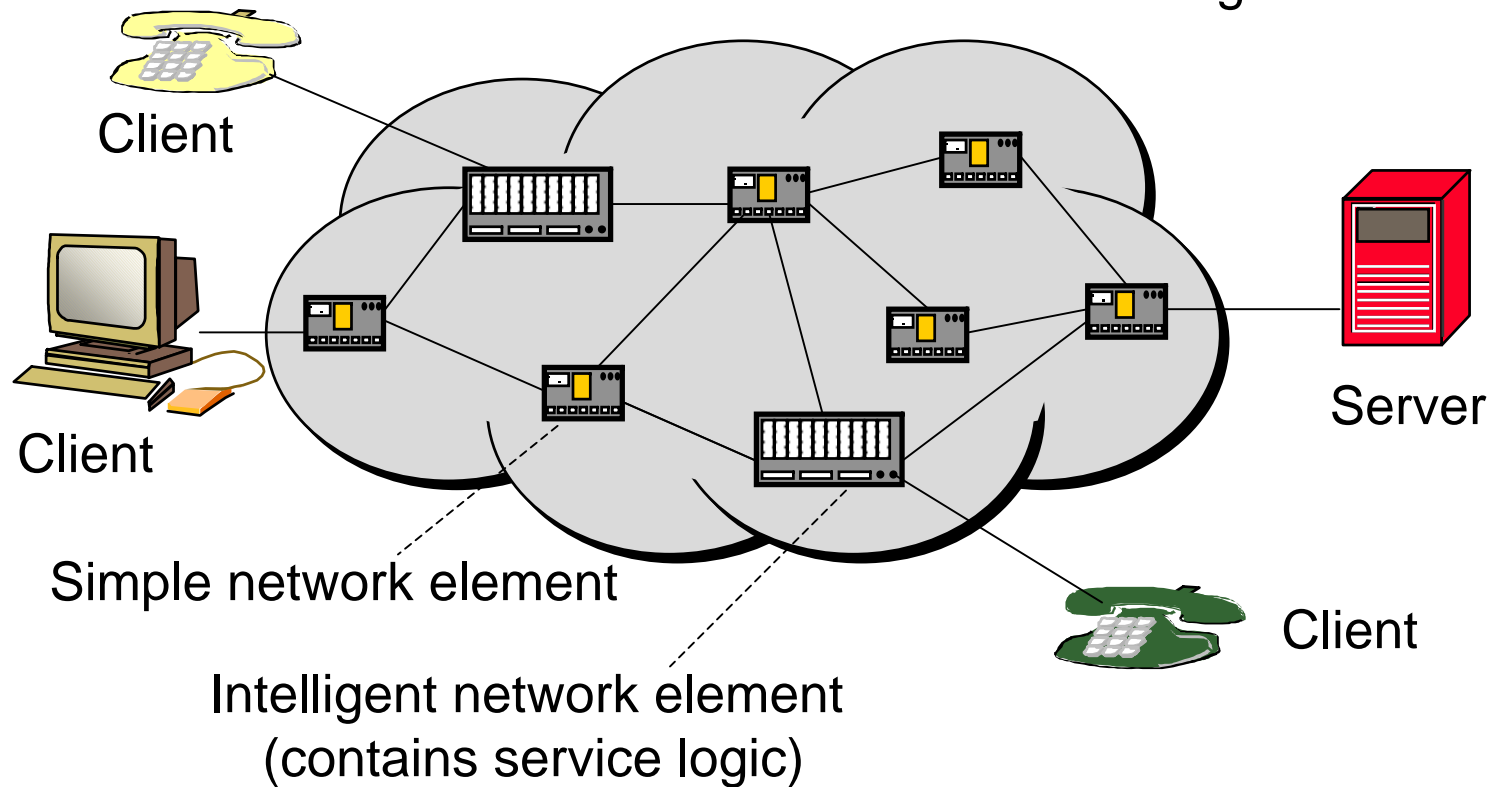
- > Summary of approaches to network intelligence
- > Positioning of current 2G and 3G architectures
- > A new approach to service oriented architectures
- > The middle A of AAA as key for service offerings
- > IST project PoLoS: applying theory to practice
- > Security issues and open issues
- > Conclusions

Summary of approaches to network intelligence

The traditional Internet way: intelligent terminals, stupid networks

The traditional telco way: stupid terminals intelligent networks

now: convergent networks



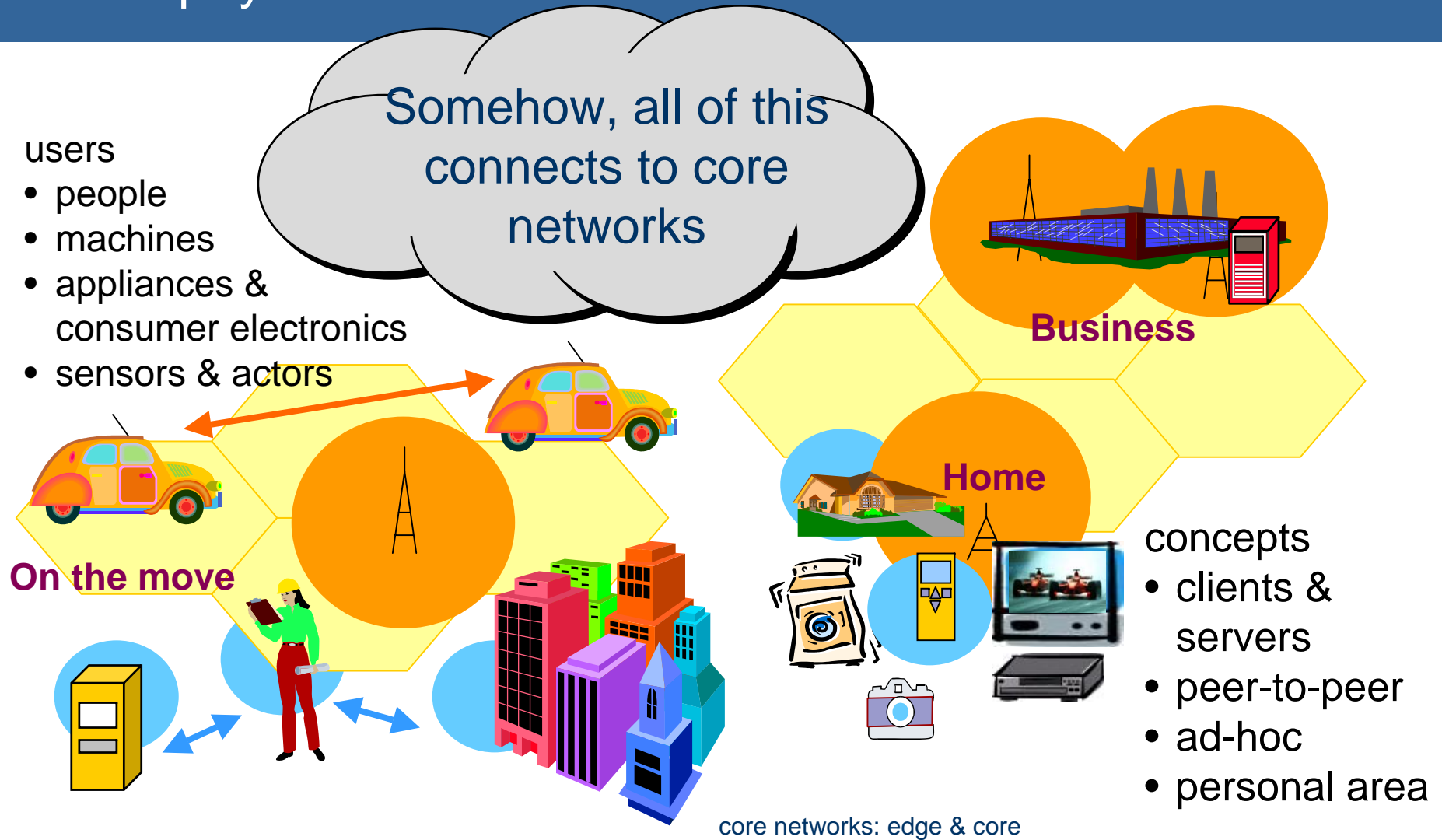
Either way

- > Not too much of a difference.
 - > However: Real networks today (i.e. telco networks and the Internet) contain a multitude of specialised network entities and are extremely complex.
 - > Convergence, as currently envisaged, increases this complexity.
 - > Complexity is driving cost, which is a major issue in today's communication networks.
- The next generation of networks is making things worse.**

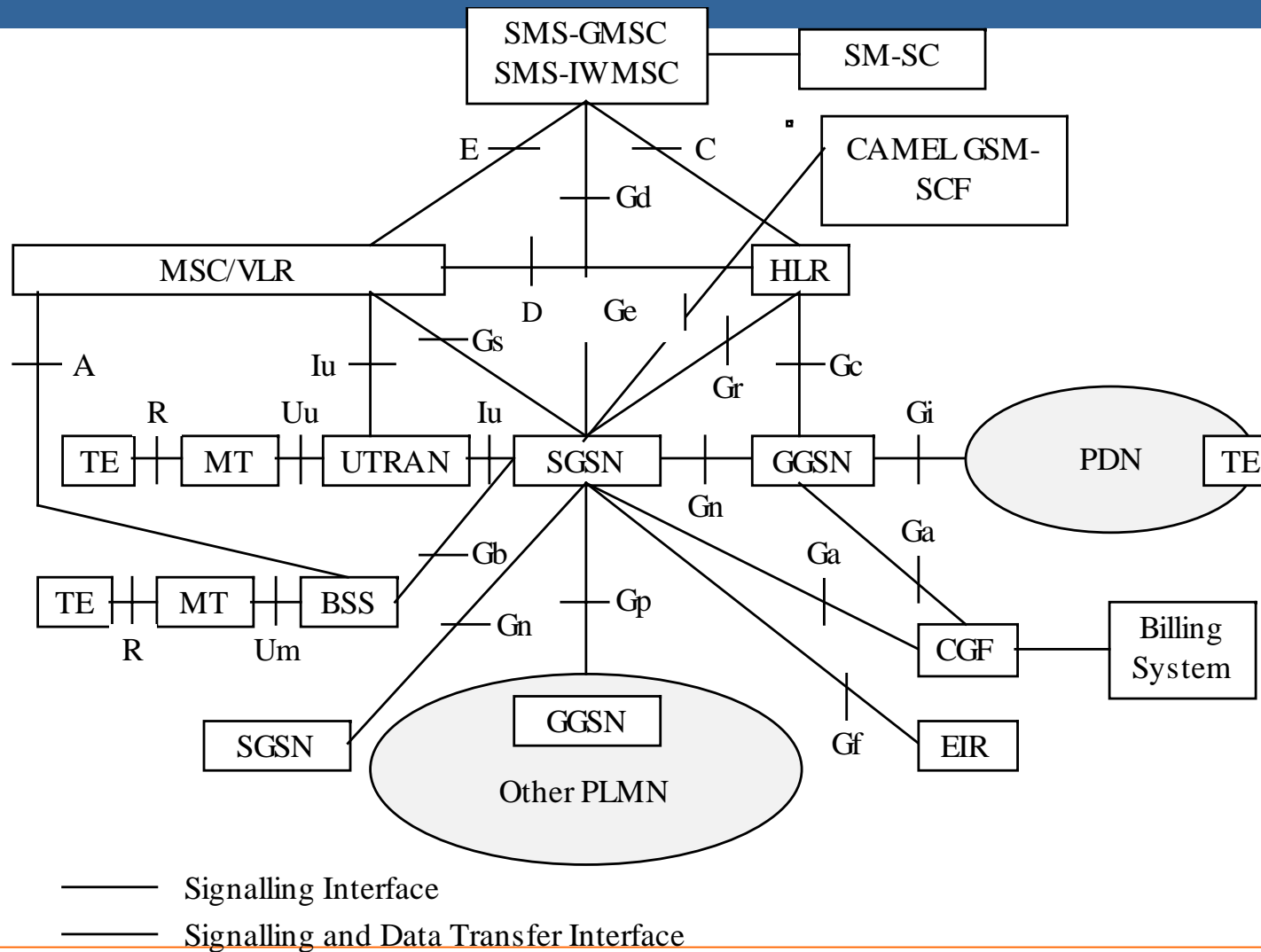
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The physical scenario



The current problem in core networks



The KILLER application in mobile networks

- > 3G and NGN still use traditional design principles: each service is mapped into an own network or new network elements and new protocols.
- > The killer application for the next 5 years:

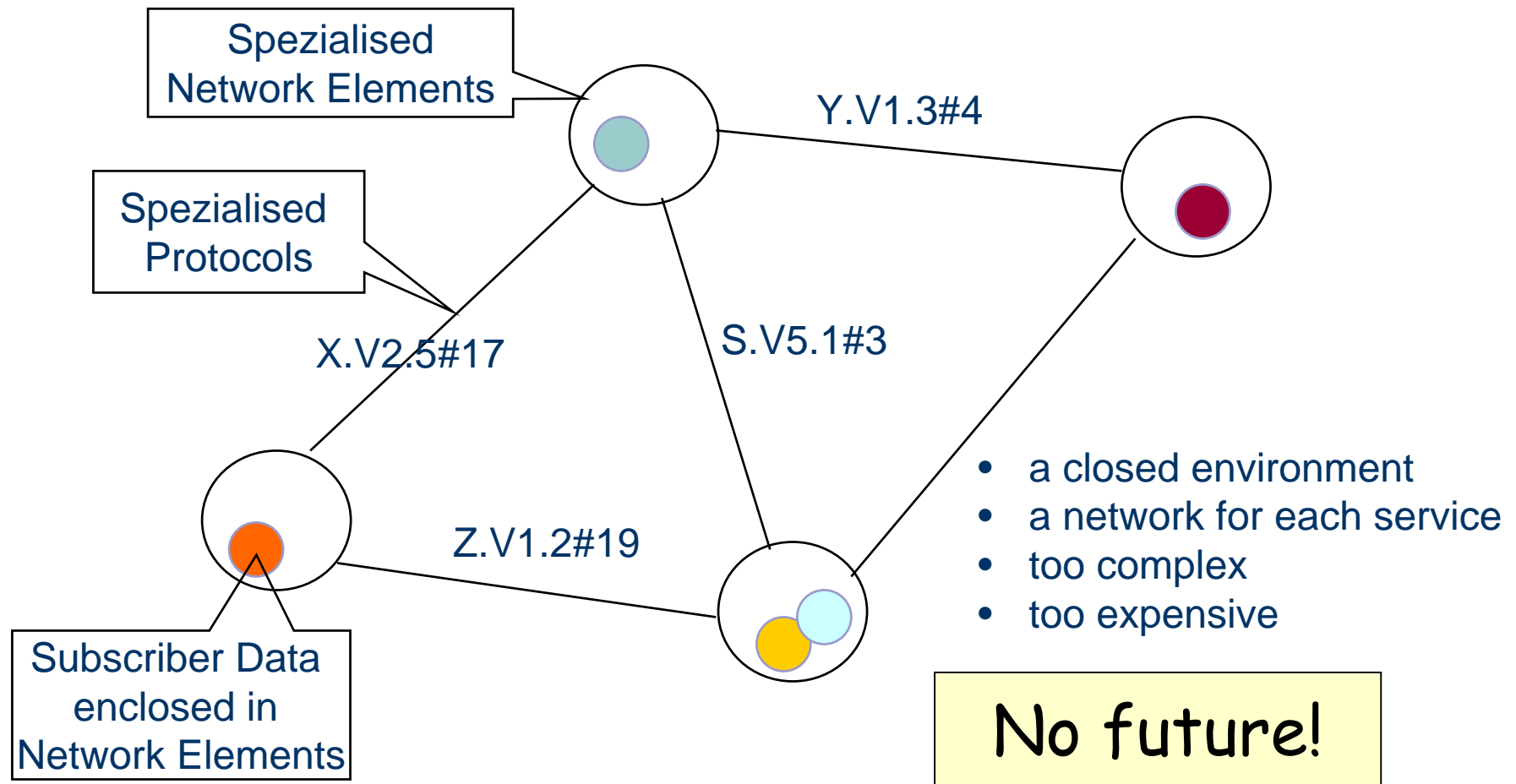
HUNDRED NICHE APPLICATIONS

- > ... but there are some general requirements on services and on the network architecture.

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General Architecture of Telco Networks Today



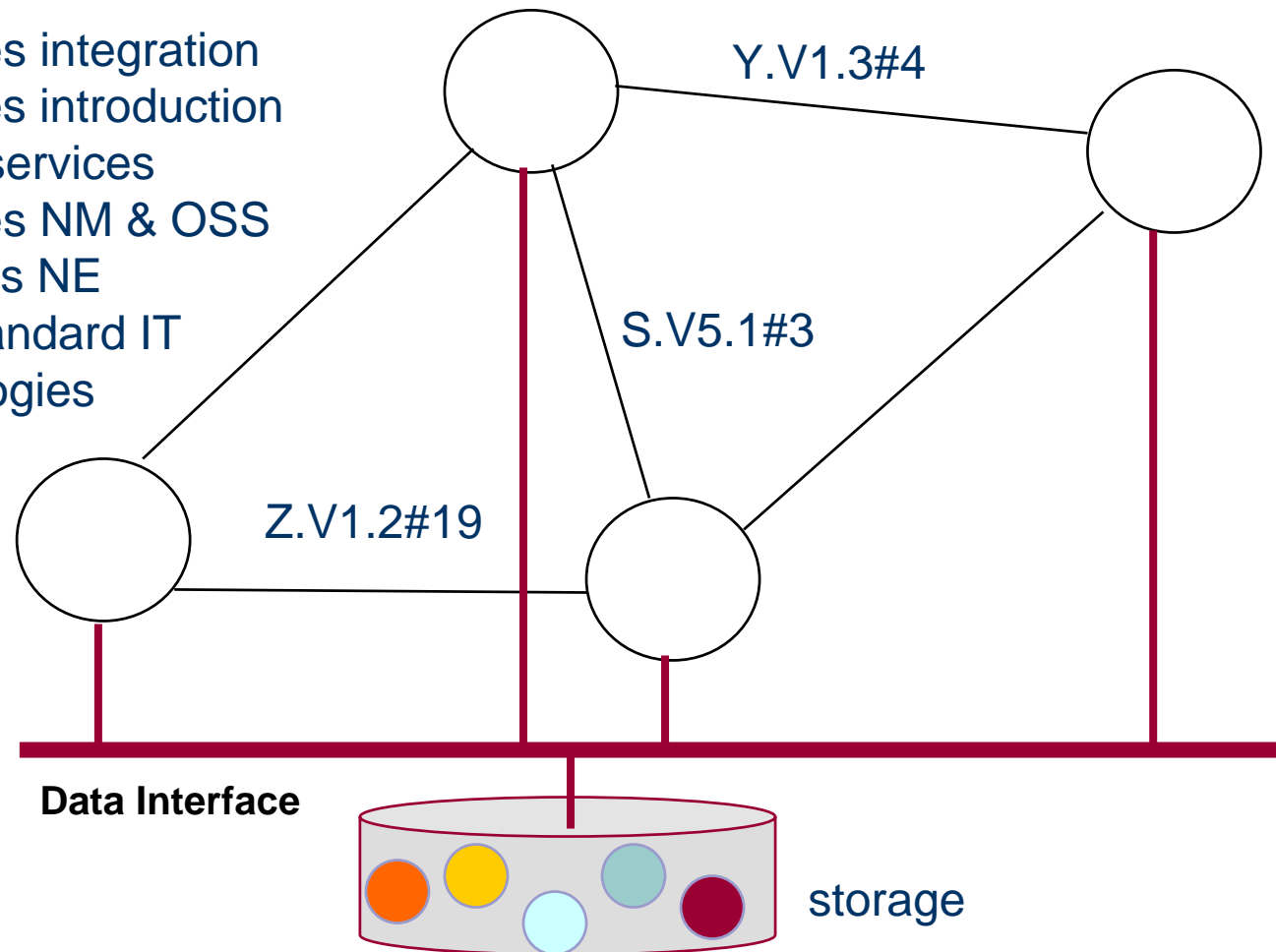
A new approach to service oriented architectures

1

The Basic Concept

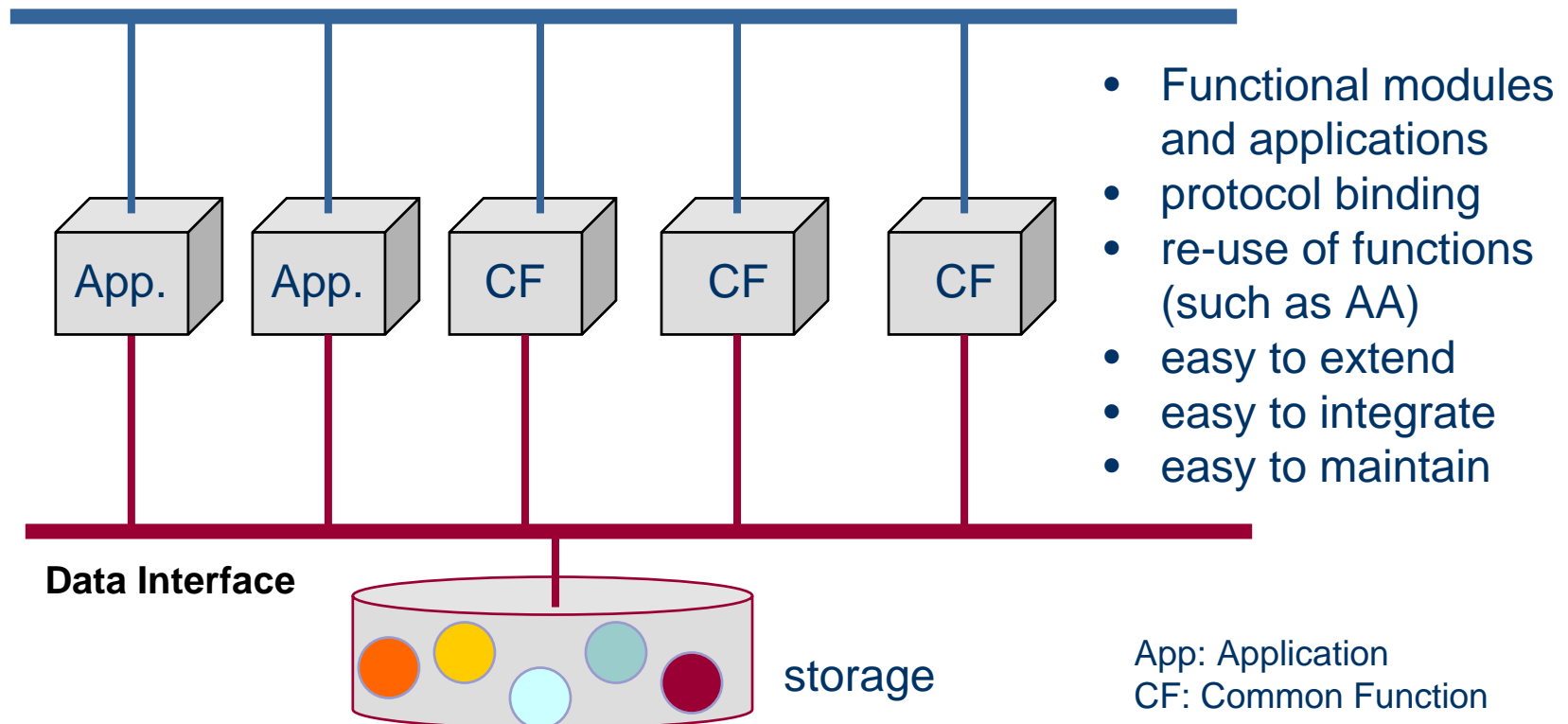
Rule 1: Get the data out of the network elements

- facilitates integration
- facilitates introduction of new services
- facilitates NM & OSS
- simplifies NE
- uses standard IT technologies

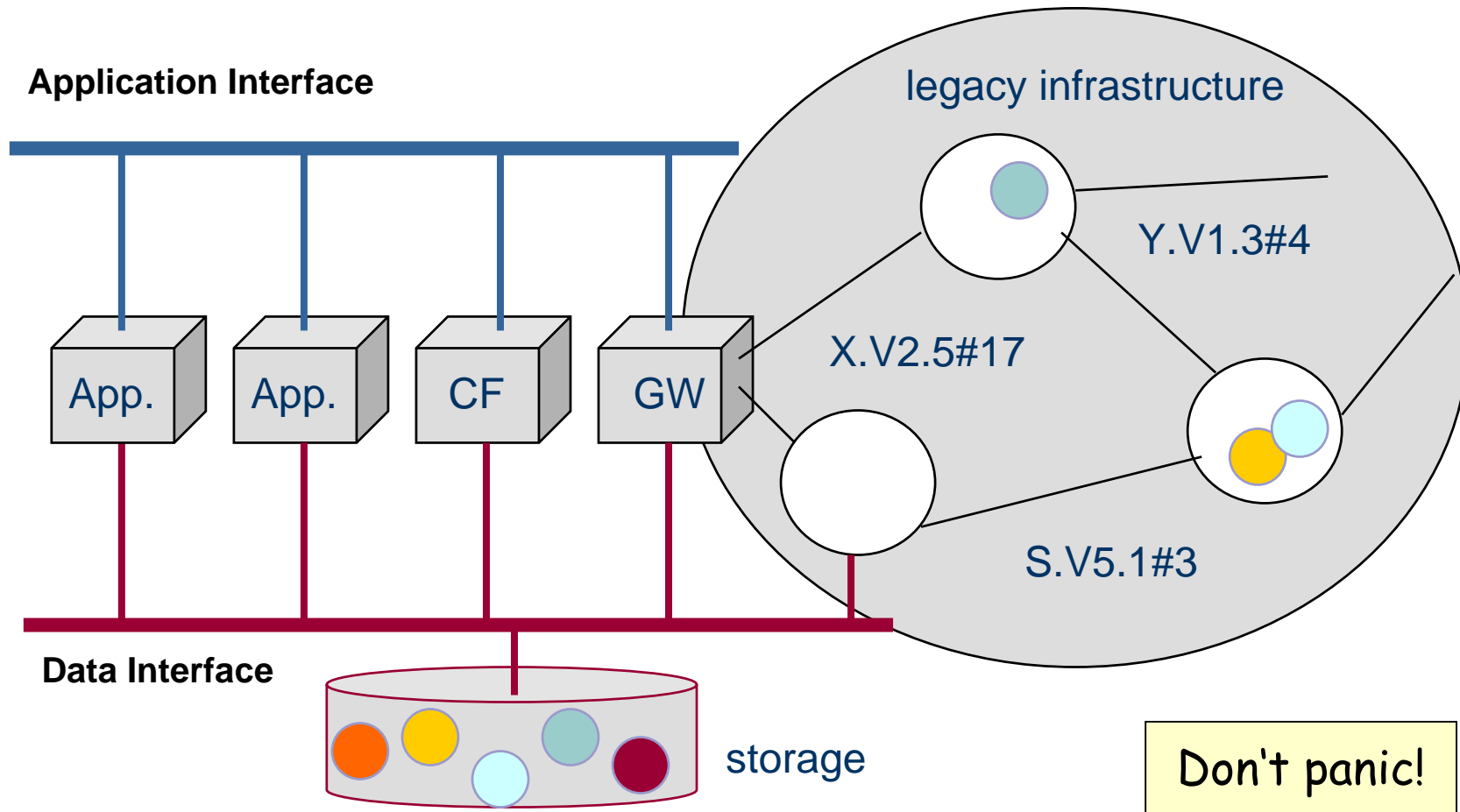


Rule 2: Use a service architecture for new applications

Application Interface



Rule 3: Integrate legacy infrastructure using gateways



A new approach to service oriented architectures

2

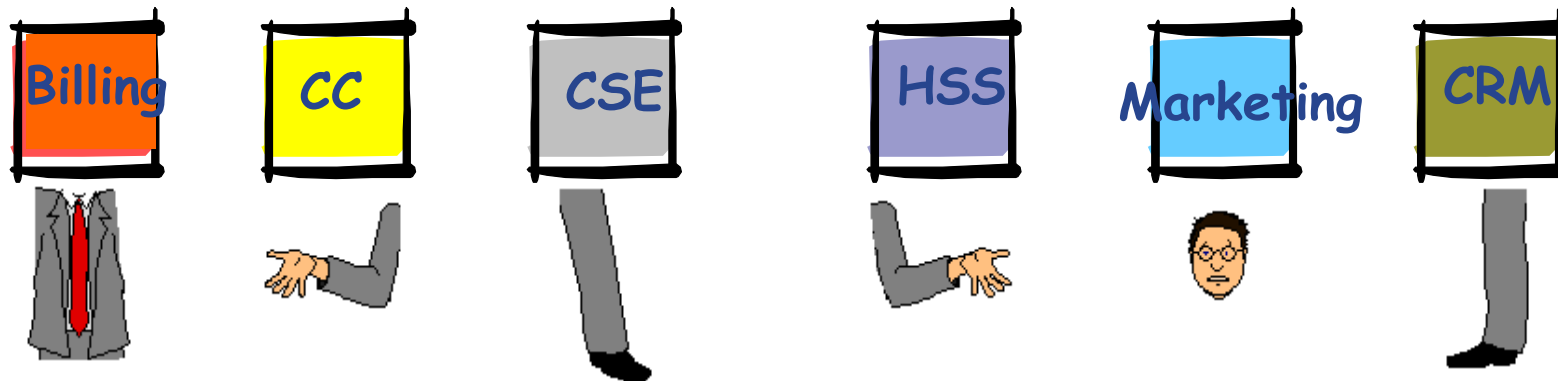
Physical & logical consolidation of storage

Benefits

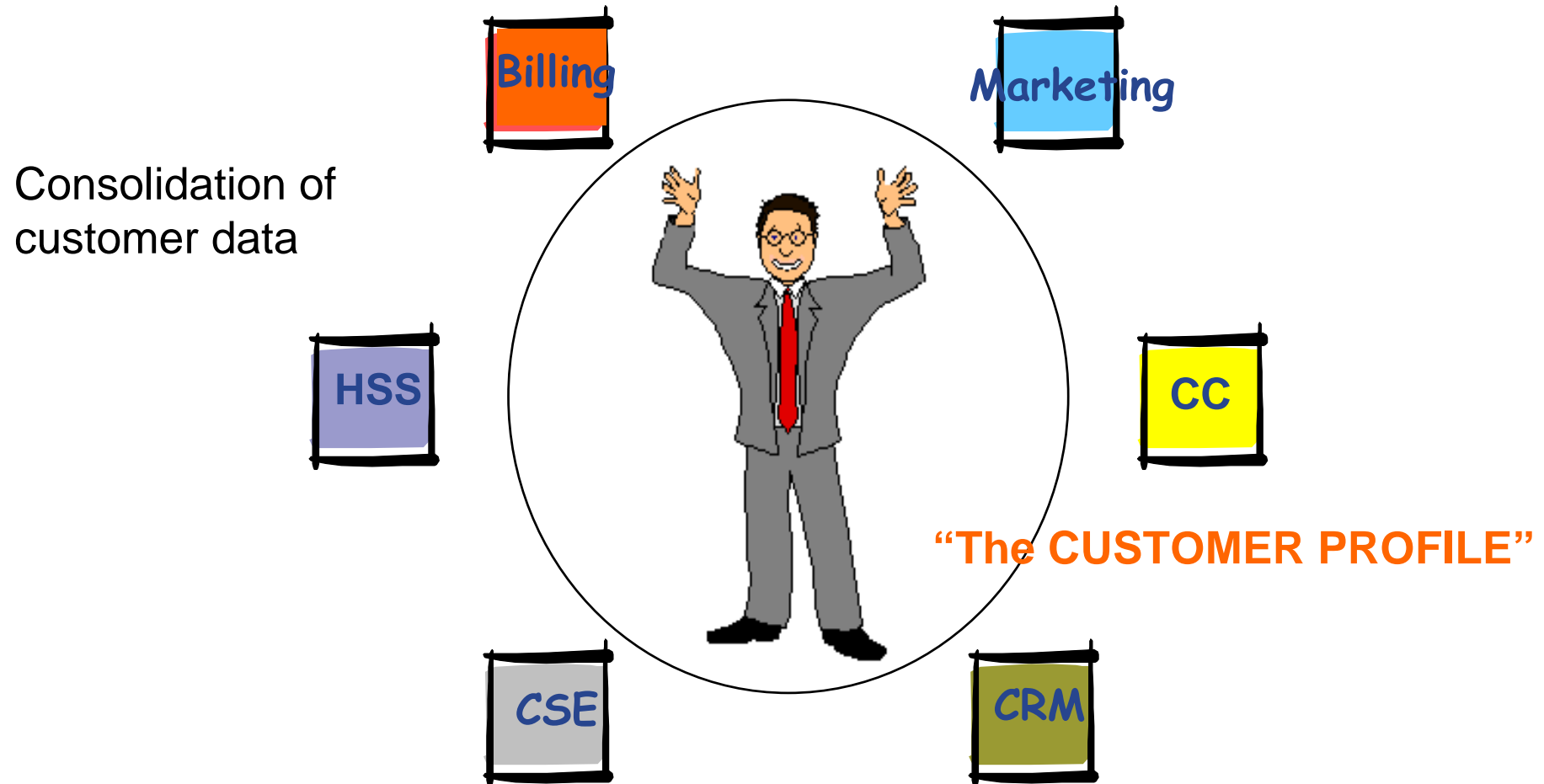
- > Storage solution off the shelf
- > Independent evolution paths - take the best from both worlds
- > Less complexity of networks elements (such as HSS and CSE) will increase reliability
- > No additional O&M for subscriber data in a SAN if incorporated into an existing SAN

HSS: Home Subscriber Server
(HLR + UMTS Mobility Server)
CSE: Came Service Element
SAN: Storage Area Network

A conceptional switch: This way...?



A conceptional switch: ... or this way?

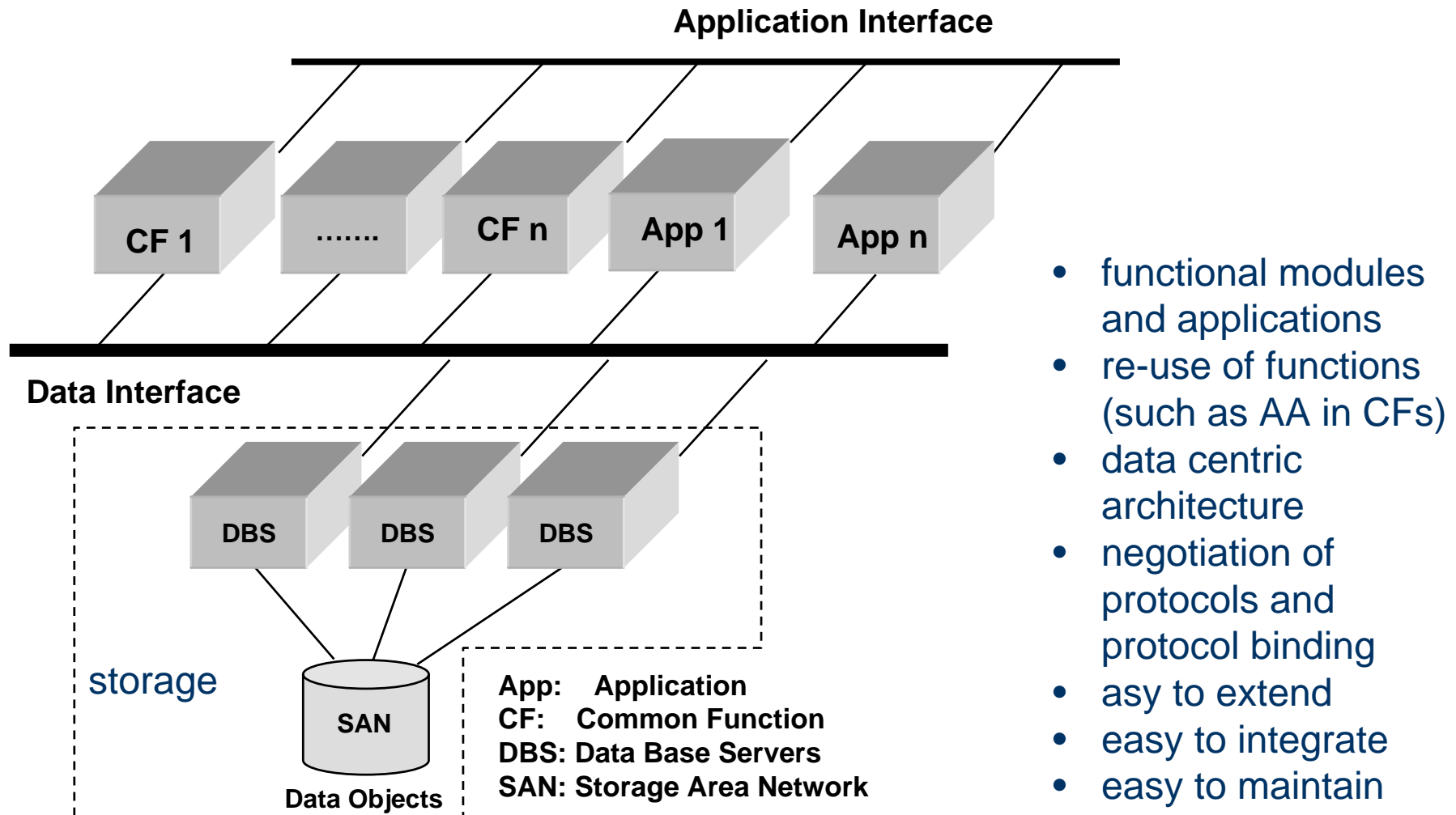


A new approach to service oriented architectures

3

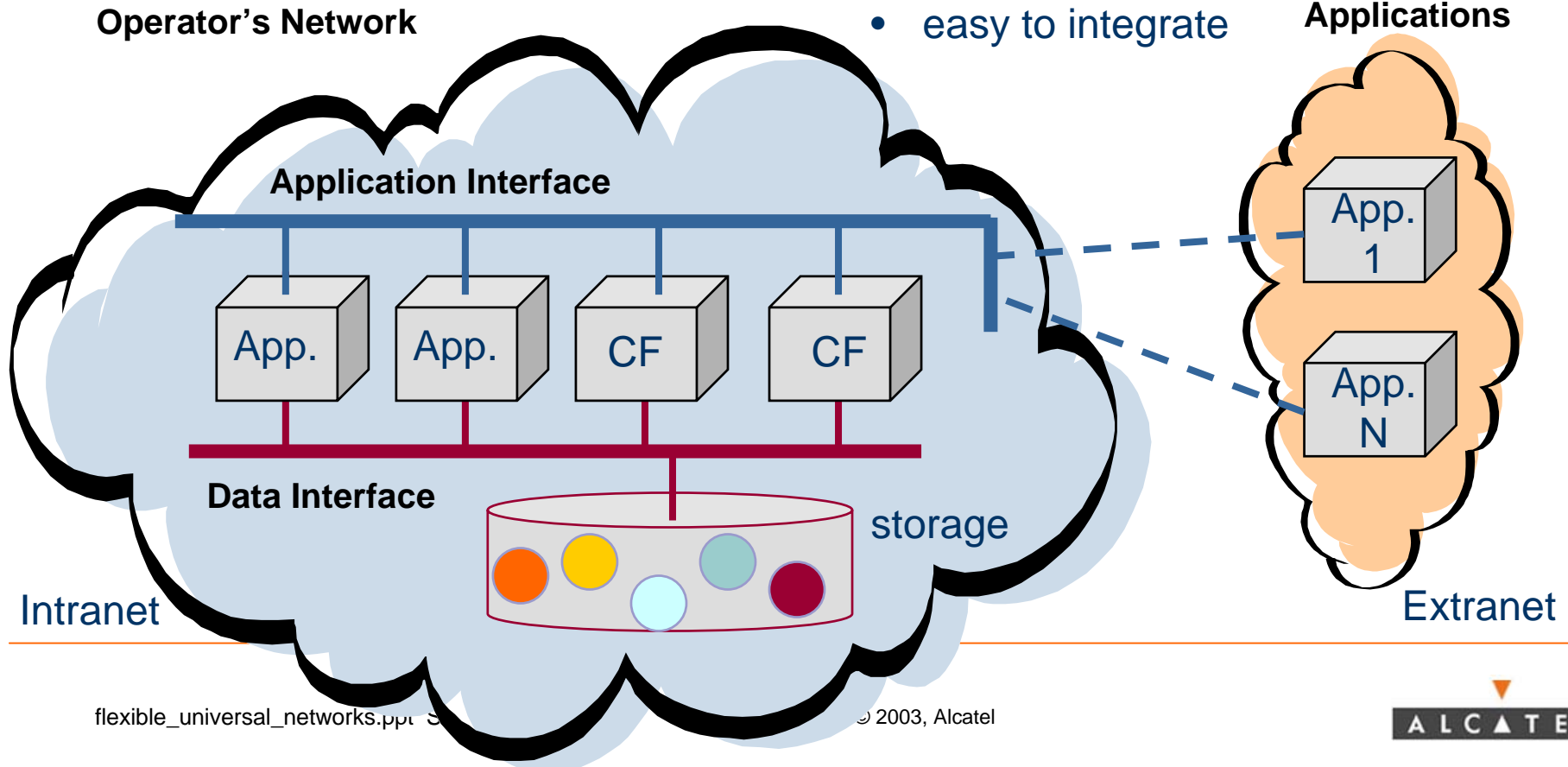
Consolidation of Interfaces

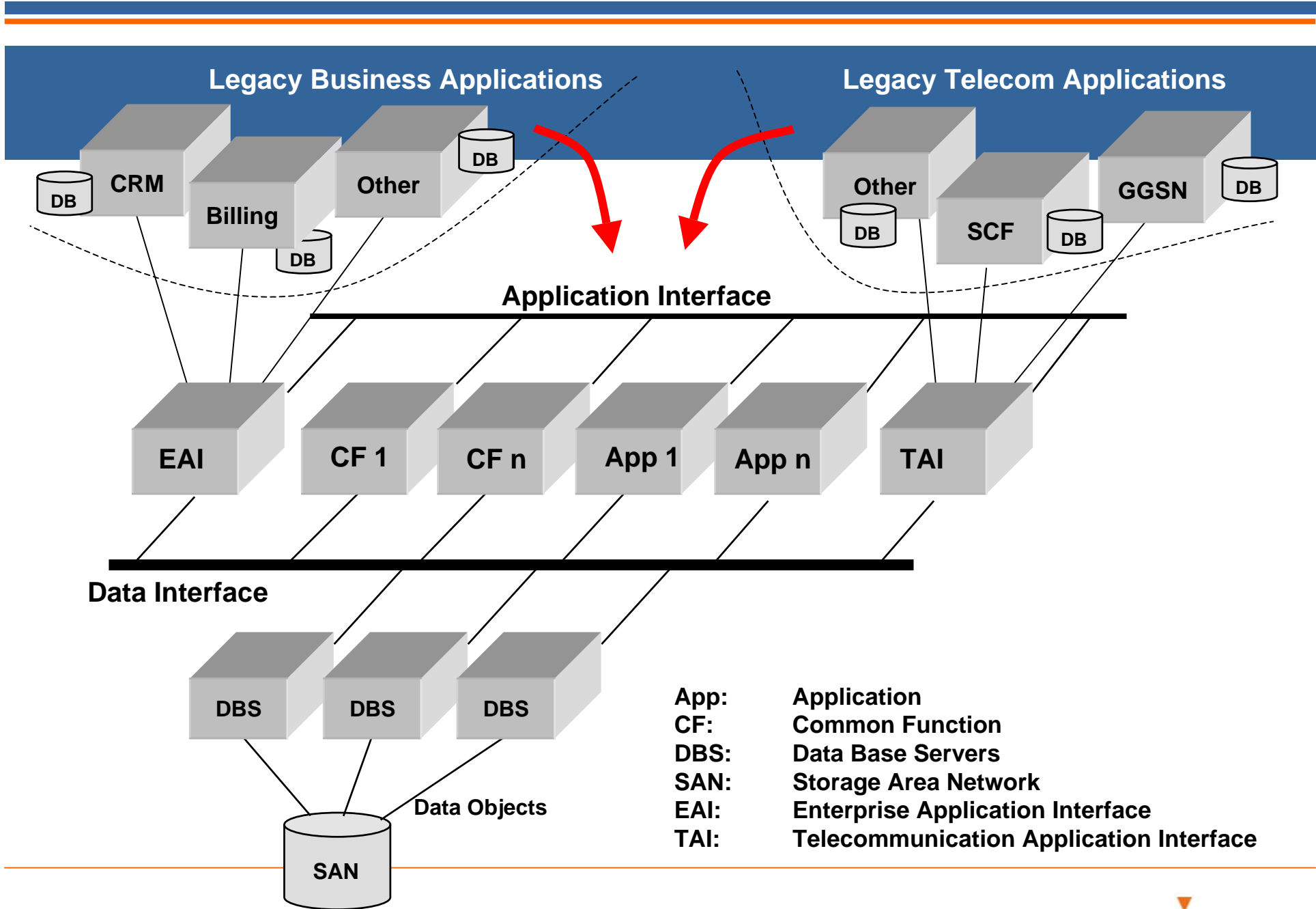
Two Busses instead of many Interfaces (Sandwich) for the internal implementation



Use a service architecture for new applications

- standard interface towards external applications (such as WSDL)
- scalable
- open
- easy to integrate





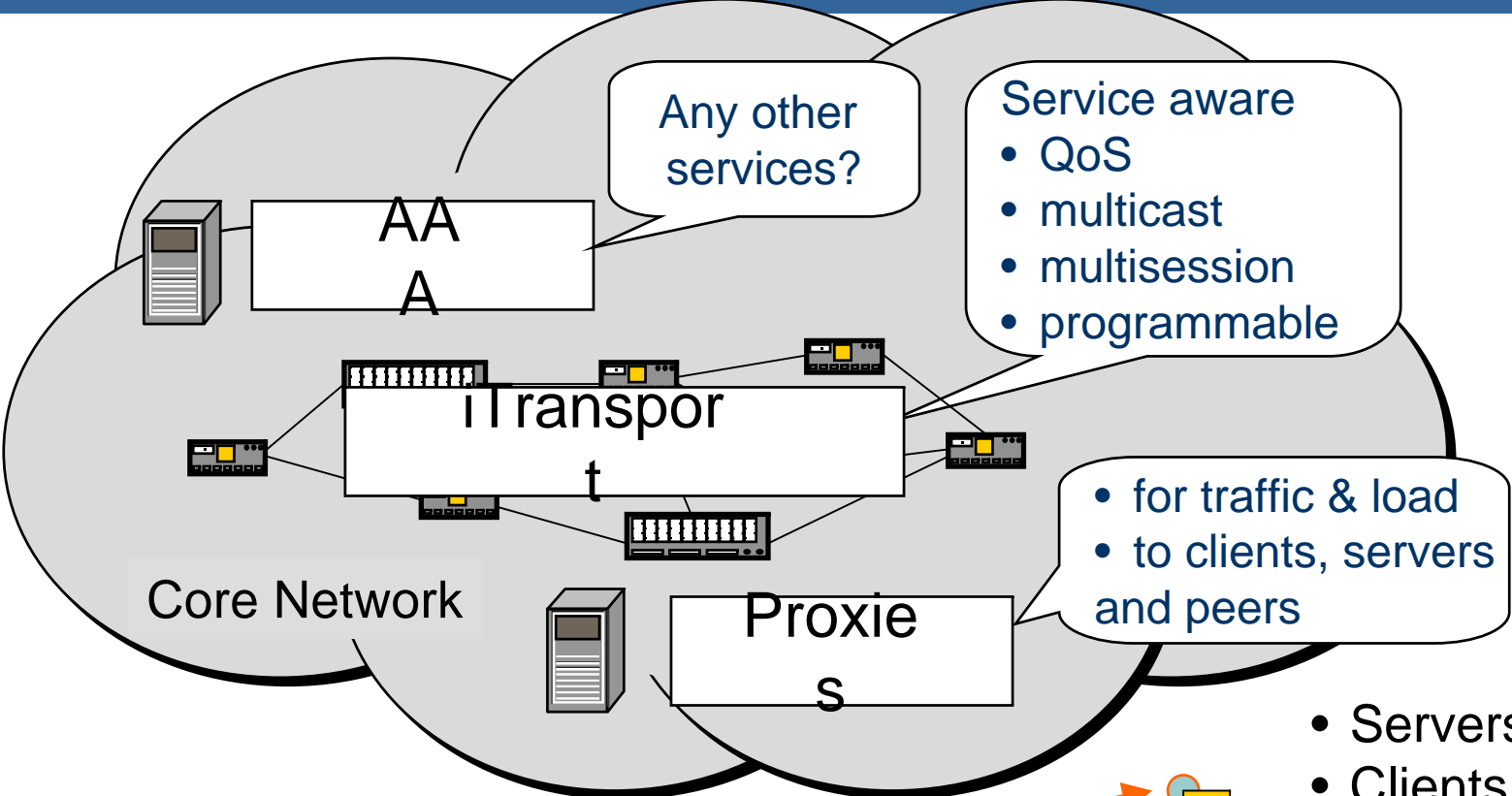
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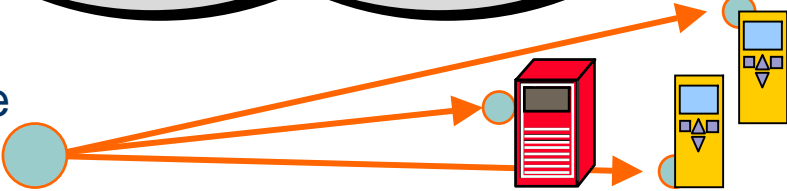
Core Network Essentials (1)

- > Grey matter: how much brain do core networks need?
- > Intelligence can be implemented in the most distributed way, such as P2P networks or Clients & Servers outside the core.
- > Some services will still need authentication, authorisation and may not be free of charge.
- > Transport will need to be intelligent, i.e. service aware, programmable and supporting security requirements.
- > Corresponding data on subscribers and services may be separated from the network elements.
- > Mobile devices and optimisation of traffic flow will need proxies.

Core Network Essentials (2)



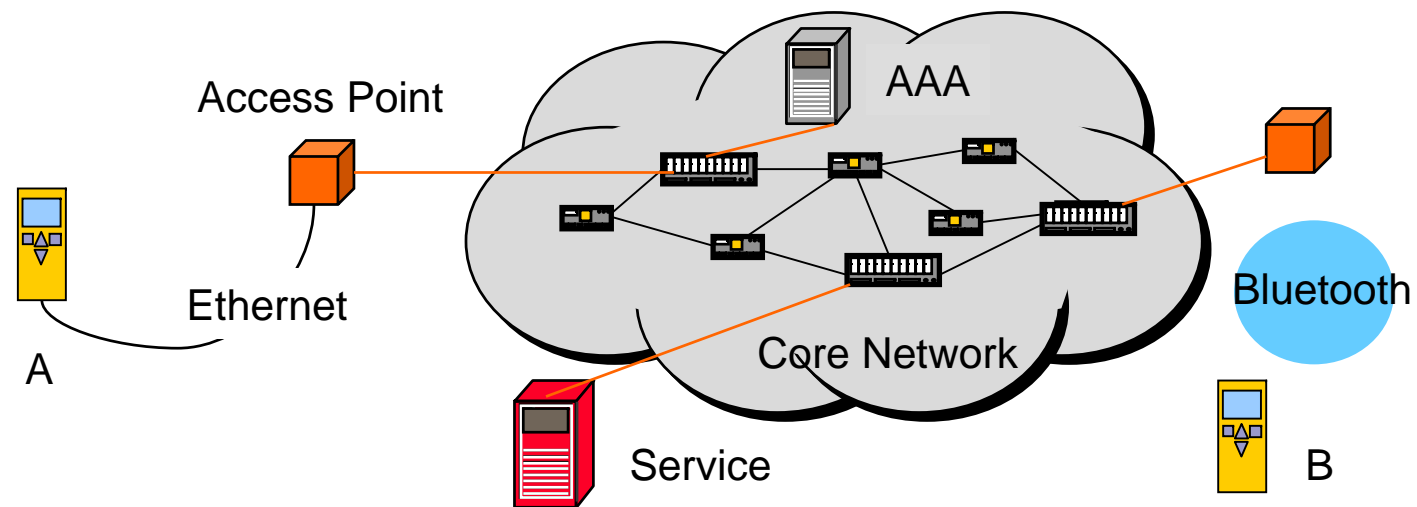
Service = Software downloaded to clients and servers



- Servers
- Clients
- Peers
- Directories
- Libraries

Example: a Service Scenario

- > In current telco networks, services are coupled with the network access. For instance, your mobile phone cannot connect to the Ethernet or to a fixed line to deliver or to receive a call. Traditional telephone subscribers only get their service at their own dedicated fixed line.
- > A future scenario will provide service over any network.



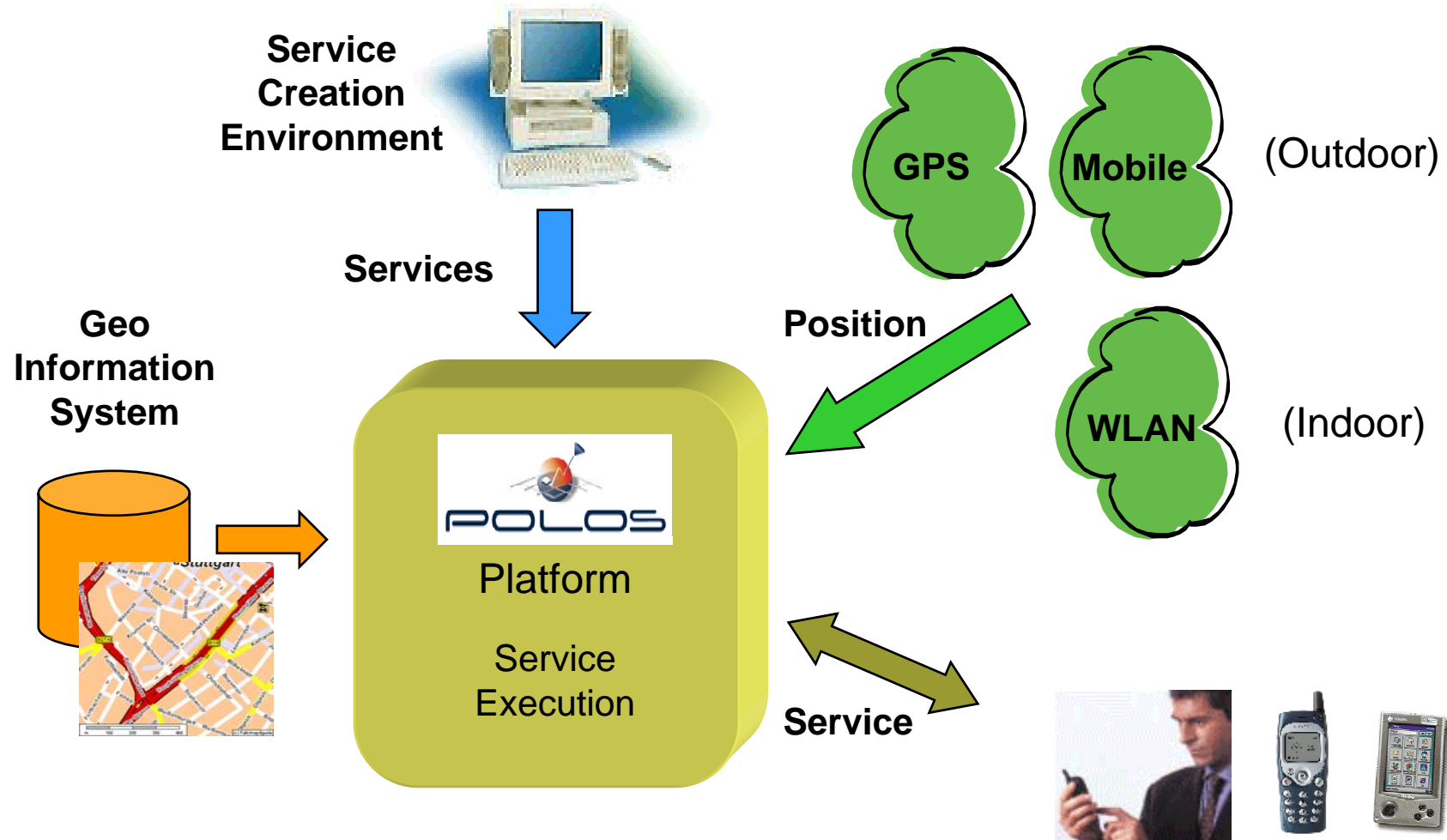
What Services does an essential Core Network provide?

- > The core network operator primarily offers transport services.
- > The usage of transport services requires authentication, authorisation and accounting.
- > Services are primarily implemented outside of the core network.
- > This does not exclude a core network operator from providing further services with own external servers.
- > The network operator may offer AAA for 3rd party services. Existing subscribers of mobile operators and fixed line operators provide a substantial basis for this.
- > Authorisation is becoming a key element for transport services and for services outside the core network.

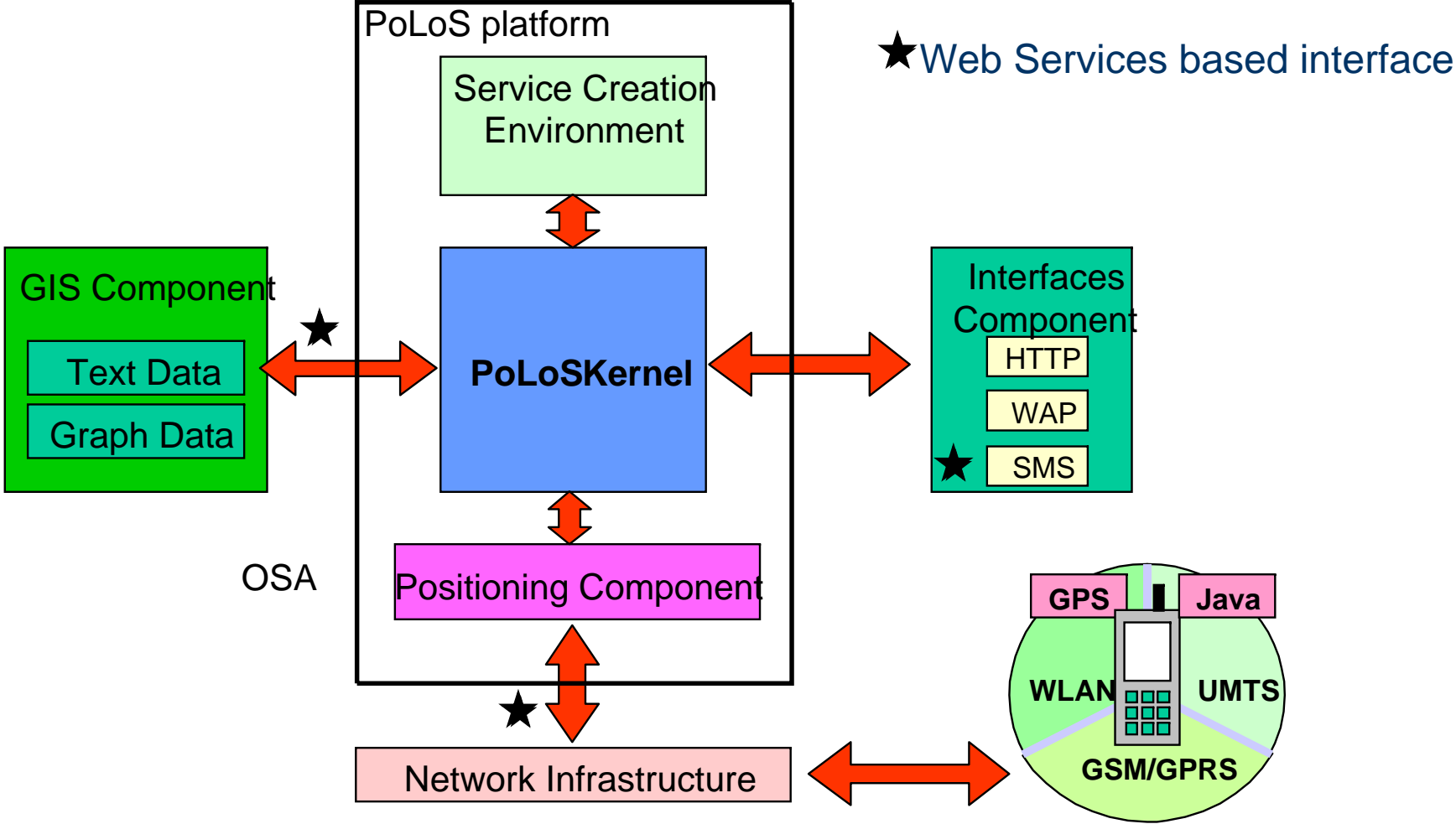
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PoLoS: Integrated Platform for Location Based Services Overview



Harmonizing the Application Interface by using Web Services technology



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Issues - the virtues of current networks

- > The currently isolated networks avoid spreading of hazards and are resilient to attacks.
- > A proven architecture with a strict design, together with rules and standards
- > A stable and reliable infrastructure which can regulate traffic and handle load situations and failures.
- > Protection of subscriber data and service profiles.
- > Safe accounting procedures.

Any new approach will have to be benchmarked against this.

There are plenty of Open Issues (1)

- > Do Flexible Universal Networks really work?
- > Are they living up to the promise of being less complex?
- > Are they easier to manage and do they simplify the provisioning process?
- > Are future services easier to implement?
- > Do they scale in a reasonable way?
- > Are they more cost efficient?
- > How to match current standards on security and reliability?

There are plenty of Open Issues (2)

- > How to do dimensioning, network design and planning?
- > How to handle boundaries between different network domains with respect to mediate the transport of services and content?
- > How to integrate legacy infrastructure?

Needs further research and proof of concept by empirical jobs such as prototypes.

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Conclusions (1)

- > Current mobile networks are extremely complex.
- > The complexity increases with each new application, and so are costs of integration, provisioning and maintenance.
- > To reverse this evolution needs some out-of-the box thinking:
 - move from a functional architecture to a data centric architecture: the storage plane
 - the consolidation of data is supported by state of the art solutions such as Storage Area Networks
 - the consolidation of interfaces is supported by state of the art solutions such as Web Services

Conclusions (2)

- > The functional content of core networks may also need some new consideration: the essential part seems to be AAA, intelligent Transport and Proxies, but there are plenty of open issues.
- > The redesign of network architectures is an extremely complex task because it needs to consider all current designs including their commercial impact.
- > All of this seems to be good stuff for joint R&D projects.

**Thank you for your
attention!**

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