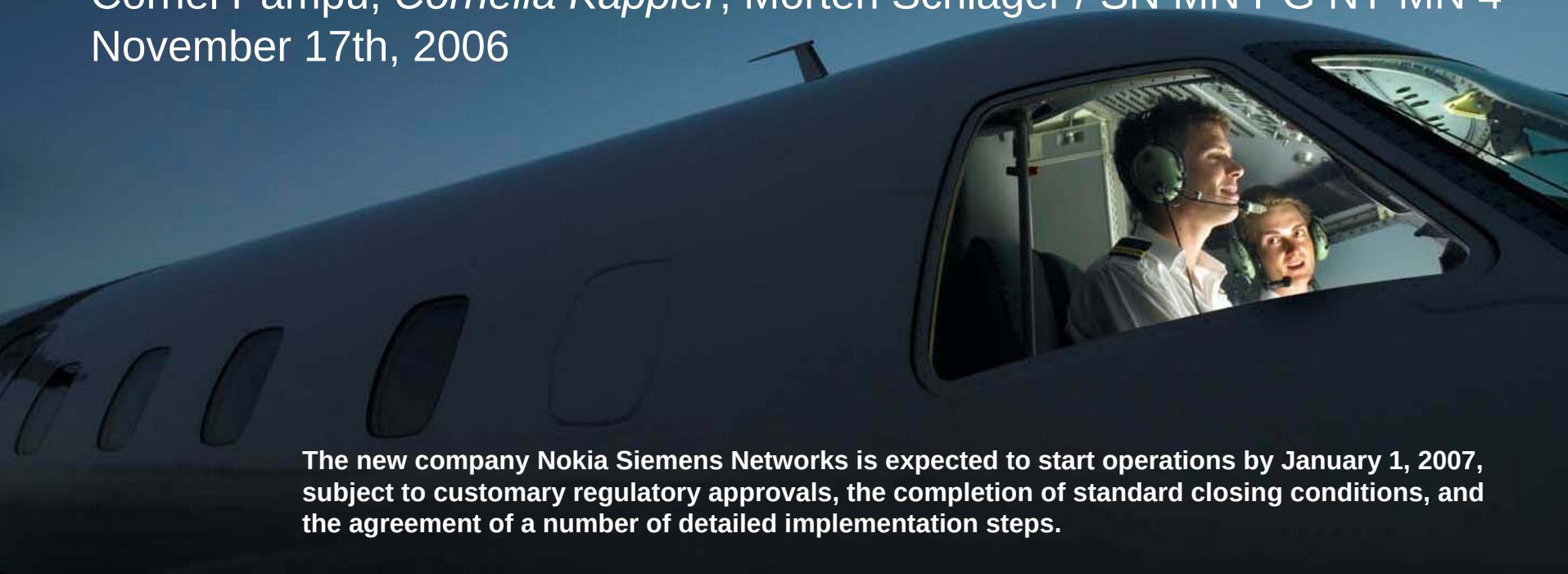
SIEMENS

Evolutionary Trends towards Beyond 3G Mobile Networks

Cornel Pampu, *Cornelia Kappler*, Morten Schläger / SN MN PG NT MN 4
November 17th, 2006



The new company Nokia Siemens Networks is expected to start operations by January 1, 2007, subject to customary regulatory approvals, the completion of standard closing conditions, and the agreement of a number of detailed implementation steps.

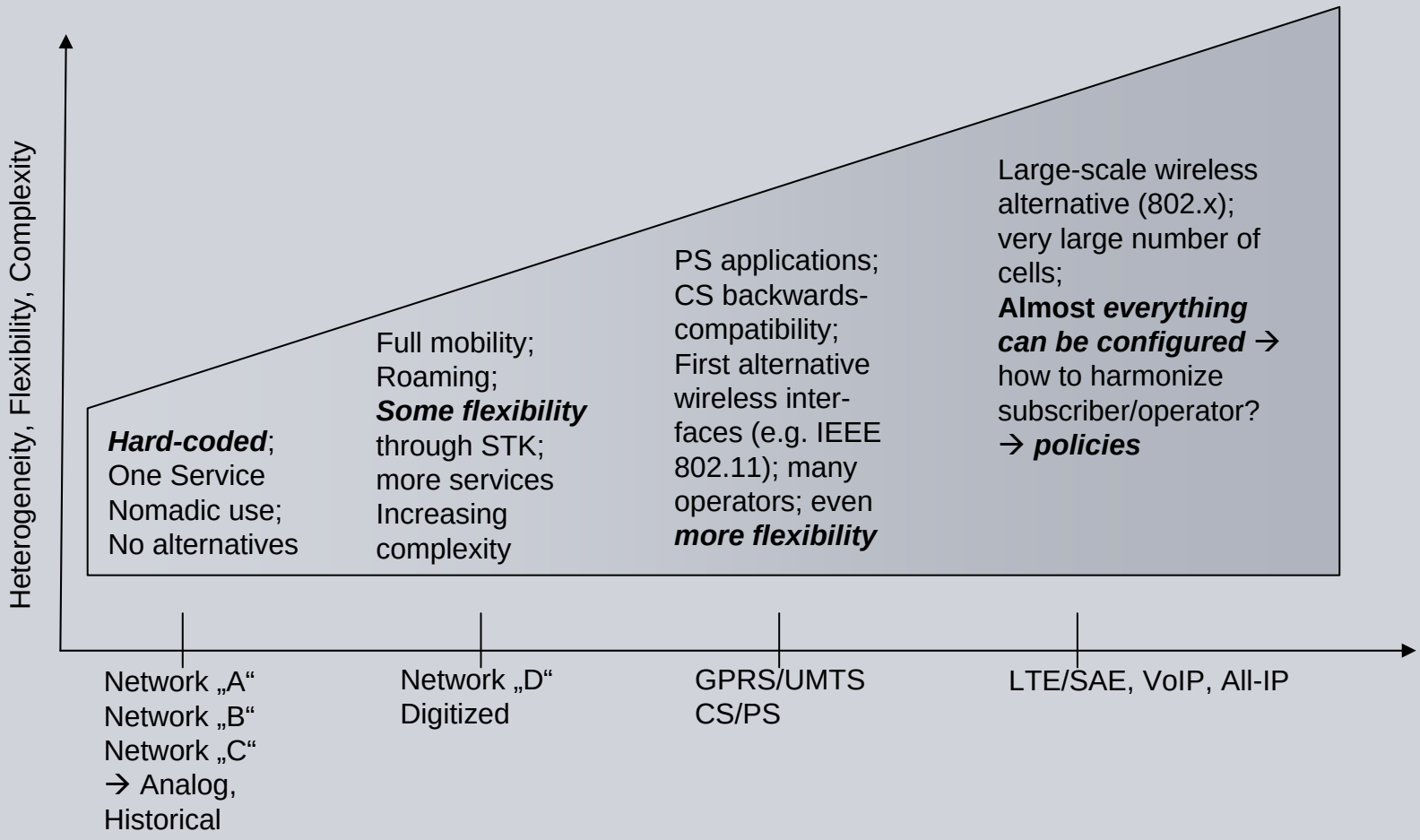
SIEMENS

Outline

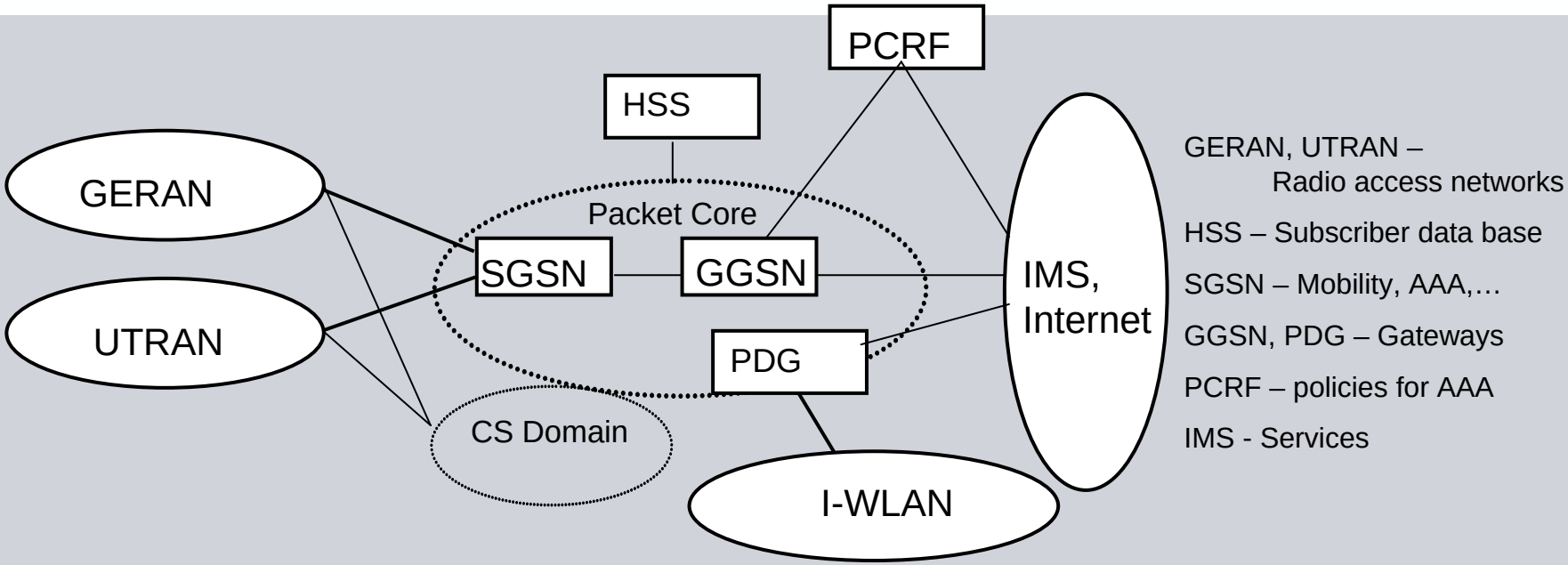
- Evolution UMTS up to SAE
- Beyond SAE
  - Flexible policy framework
  - Dynamic configurability [Network Composition]

Evolution of mobile networks: Increased Heterogeneity, Flexibility and Complexity

SIEMENS



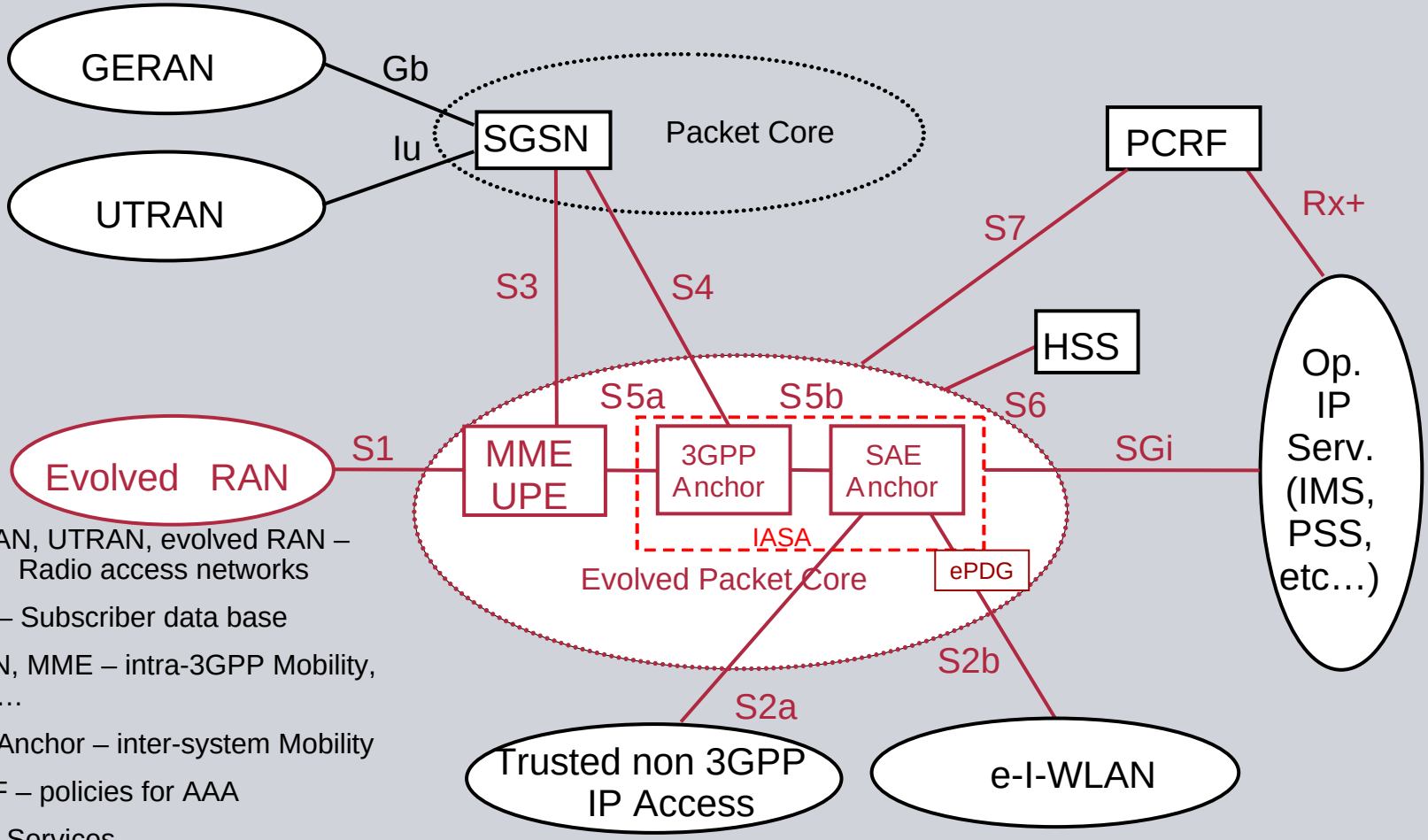
UMTS: Core Network Architecture (Rel6)



- Current drivers for evolving UMTS
  - Support higher bit rates
  - Support of multiple (incl non-3GPP) access networks
    - Inter-access mobility
    - Access-independent authentication framework
  - High quality network services

⇒ Long Term Evolution (LTE) and System Architecture Evolution (SAE)

SAE: Core Network Architecture



GERAN, UTRAN, evolved RAN – Radio access networks

HSS – Subscriber data base

SGSN, MME – intra-3GPP Mobility, AAA,…

SAE Anchor – inter-system Mobility

PCRF – policies for AAA

IMS - Services

* Color coding: red indicates new functional element / interface

Scenarios and architecture are currently under investigation in 3GPP

SIEMENS

Beyond SAE Core Network Architecture

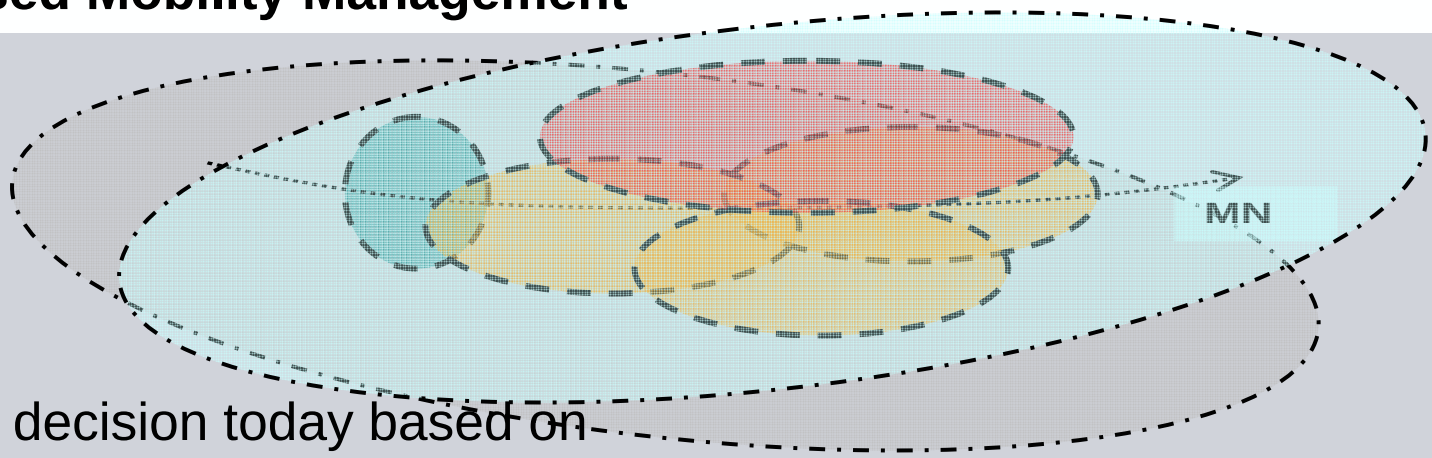
- SAE solves heterogeneity
  - Presumably in a static fashion

- Deal with heterogeneity, flexibility…
  …while maintaining high-quality network services
  - Seamless mobility
  - QoS
  - Security
  - Charging

  - Flexible policy framework
    - Policy-based mobility management
    - Policy-based flow management
    - Policy-based charging
  - Dynamic configurability [Network Composition]
    - Charging self-configuration
    - Nomadic IWLAN

SIEMENS

Policy-based Mobility Management



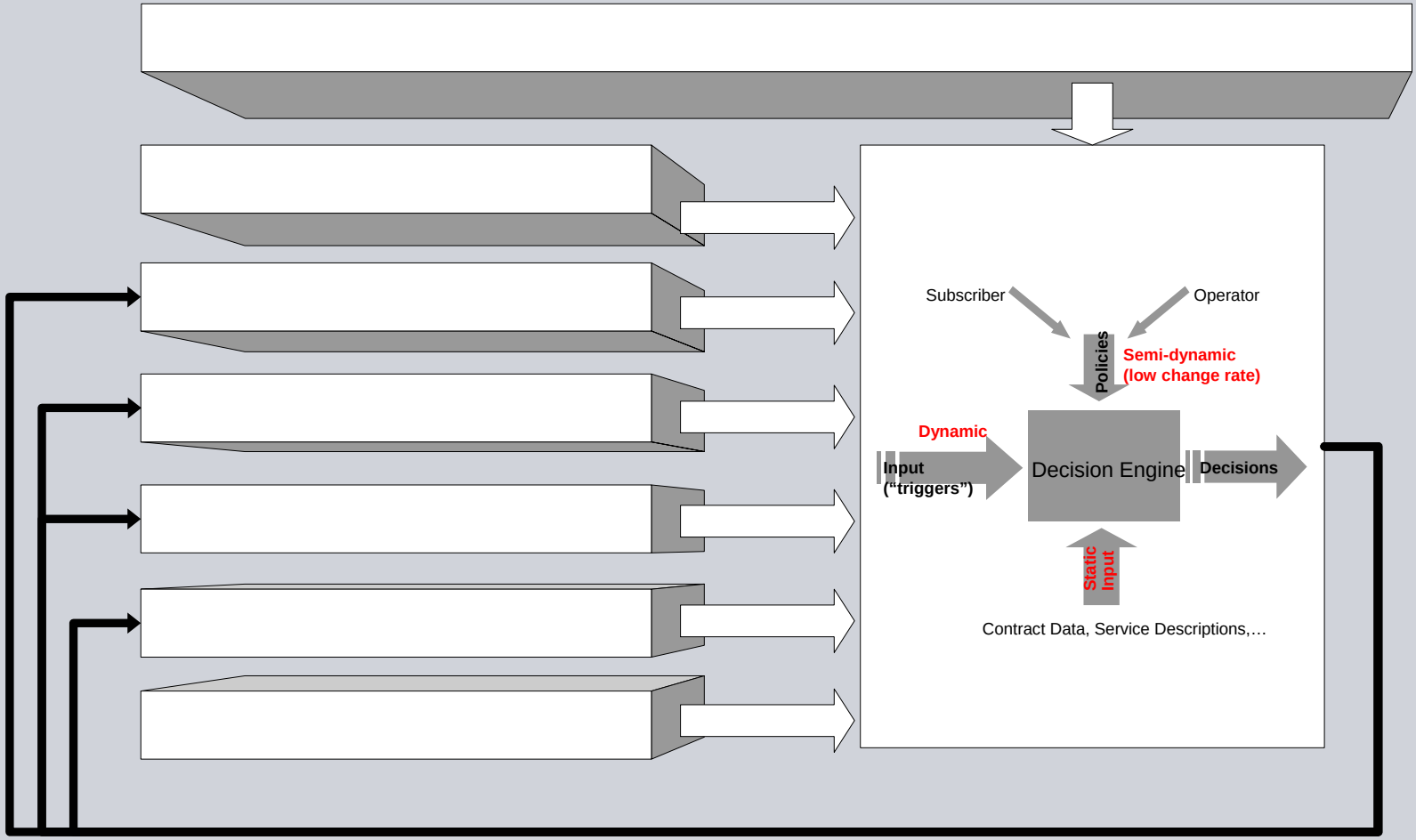
- Handover decision today based on
  - Signal reception quality, resource availability
    - Hard coded
- In heterogeneous environment handover decision based on
  - Signal reception quality
  - Velocity
  - Pricing
  - User preferences
  - Operator preferences

⇒Policy-based mobility management
  - Flexible
  - Shields complexity from user

Policy Based Mobility Management

Layers & Mobility

SIEMENS

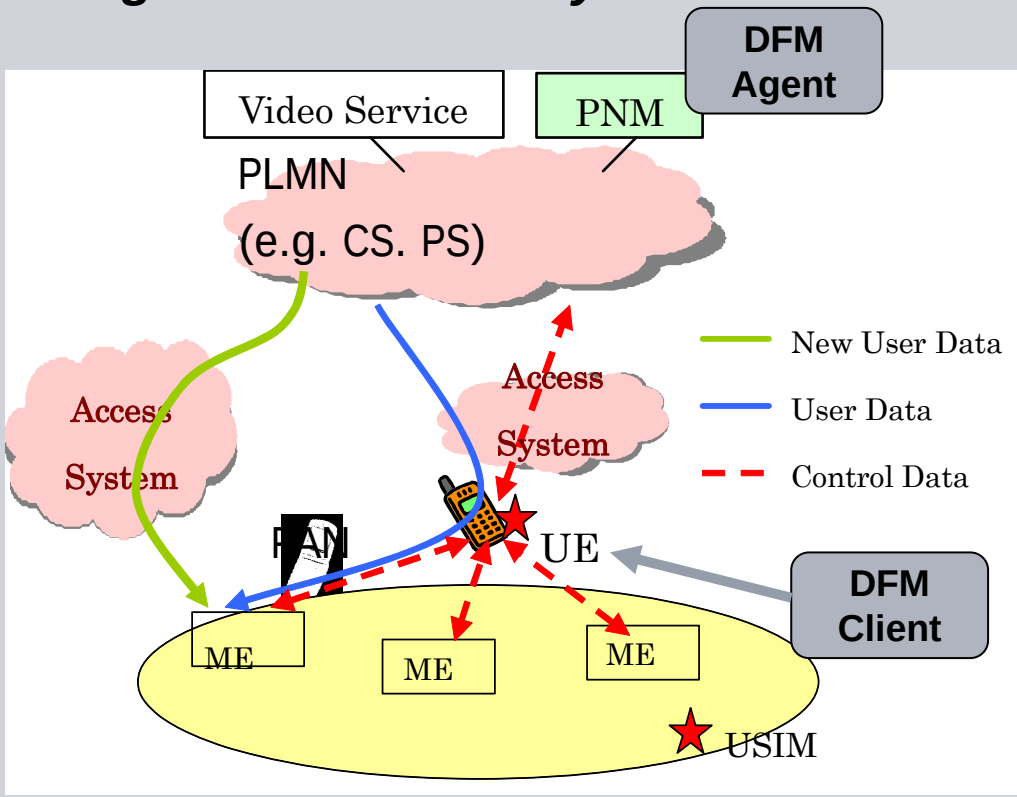


SIEMENS

Policy-based flow management / Dynamic Flow Management (DFM)

"SA1 discusses how users access a PLMN from their PANs using multiple network connections through other access systems"

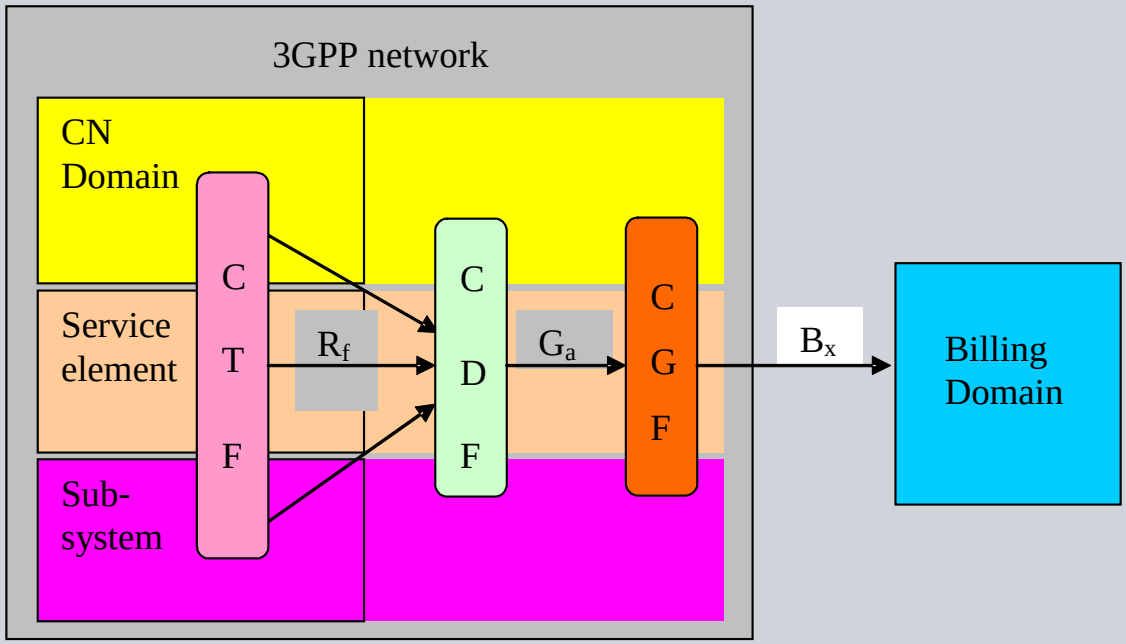
- Specific PNEs (i.e. MEs) within a PAN have their own network connections.
- User may want to receive the video service through a more suitable PNE and AS.
- User selects "best" access and re-directs traffic using DFM.
- User has to authorize the re-direction via DFM Agent@ PNM.



PNM….Personal Network Management
PNE…. Personal Network Entity

3GPP TS 22.259 V8.1.0 (2006-09), section A.3

Policy-based charging



Generic off-line Charging Architeccture in Rel.6

CTF – Charging Trigger Function

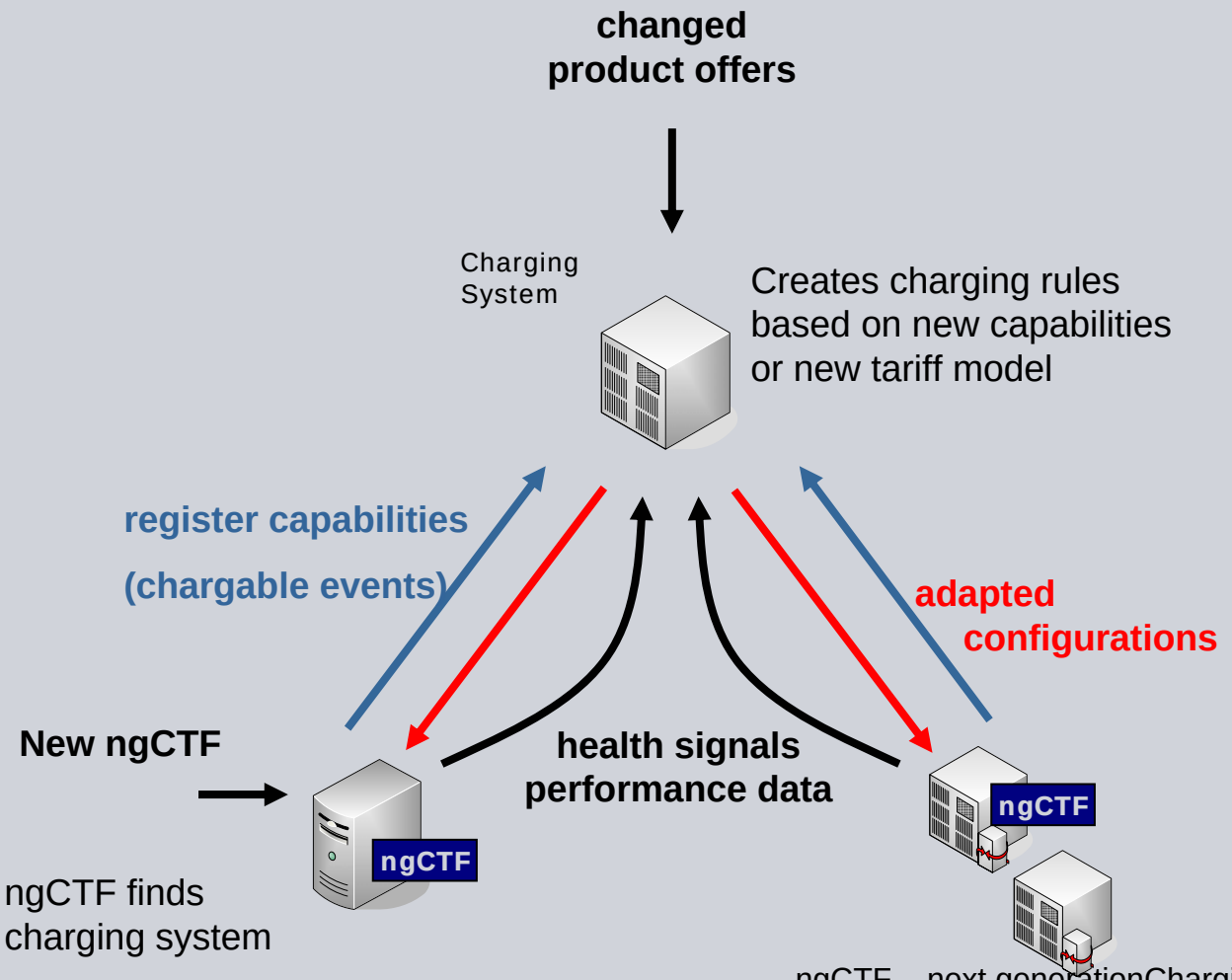
CDF – Charging Data Function

CGF – Charging Gateway Function

(TS 32.240)

- Charging data collection in CTF today hard coded
  - „Flow-based charging“ allows policy-defined selection of flows
- More flexibility by allowing policy-based reconfiguration of CTFs
  - Support new tariff models
  - Load balancing

Dynamic Configurability Charging self-configuration



ngCTF – next generationCharging Trigger Function

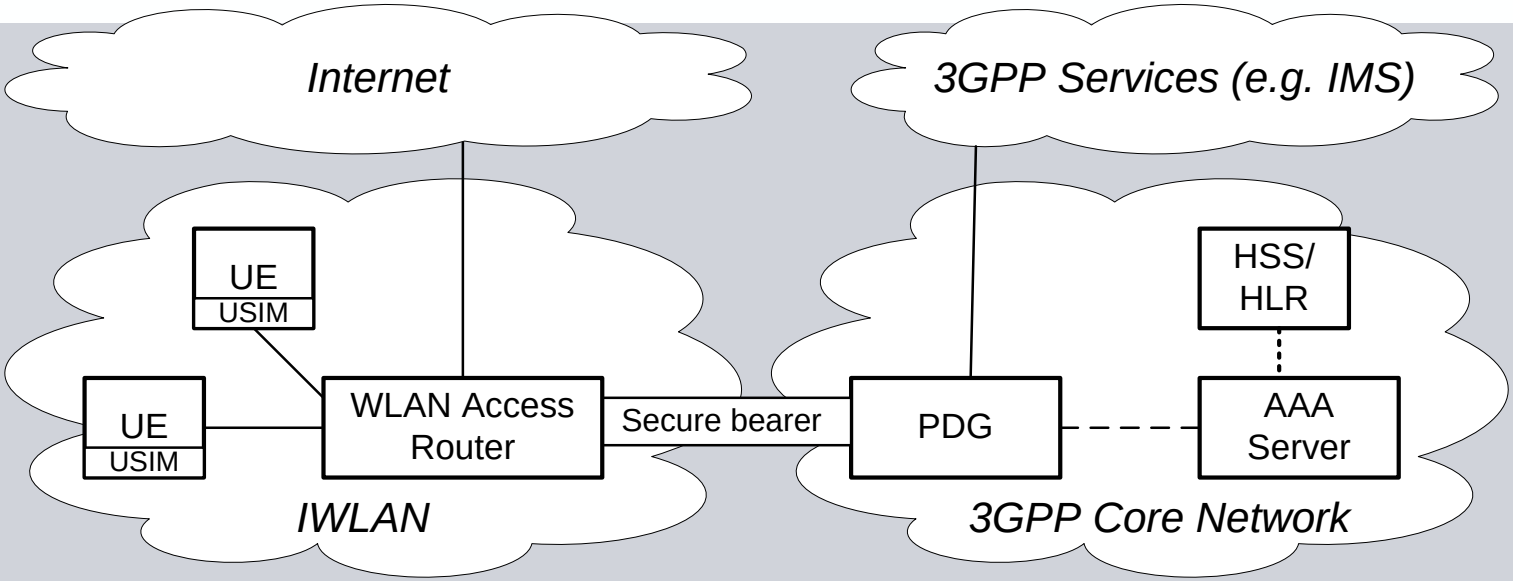
SIEMENS

Network Composition

- Network interworking today hard-coded
  - IWLAN
  - Roaming Agreements
- Dynamic, uniform procedure to achieve network interworking: Network Composition
  - EU Project Ambient Networks
- **Uniform** procedure
  - independent of network type and technology
- **Dynamic** procedure
  - minimize human intervention
- Feasibility studied in 3GPP SA1 Study Item „Network Composition“
  - TR 22.980

SIEMENS

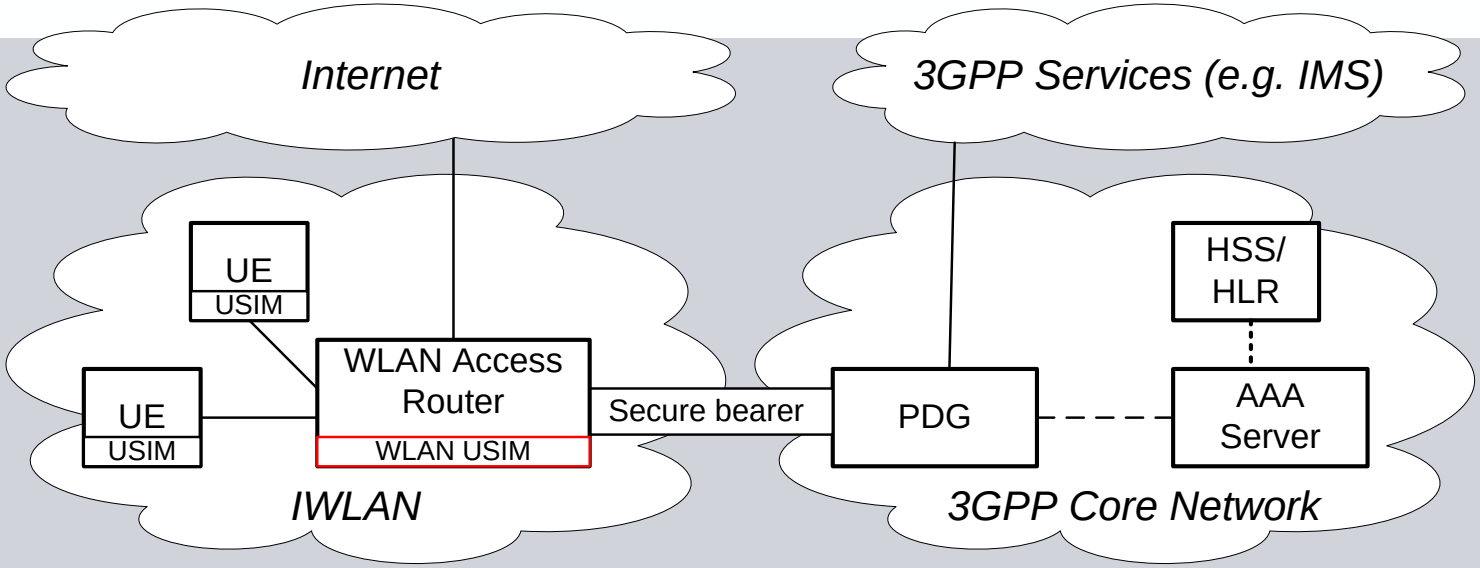
Composition of a nomadic IWLAN – Starting Point



- Static interworking of a WLAN Access Network and a 3GPP network standardized in TS 23.234 („IWLAN“)
  - Allows UEs to access the IWLAN / Internet / 3GPP Services on basis of USIM
    - Authentication, Authorization and charging handled by 3GPP Network
  - Interworking is manually configured
  - Interworking is static: IWLAN expected to be immobile
- Composition enables making the scenario dynamic

Composition of a nomadic IWLAN – Business Case & Scenario

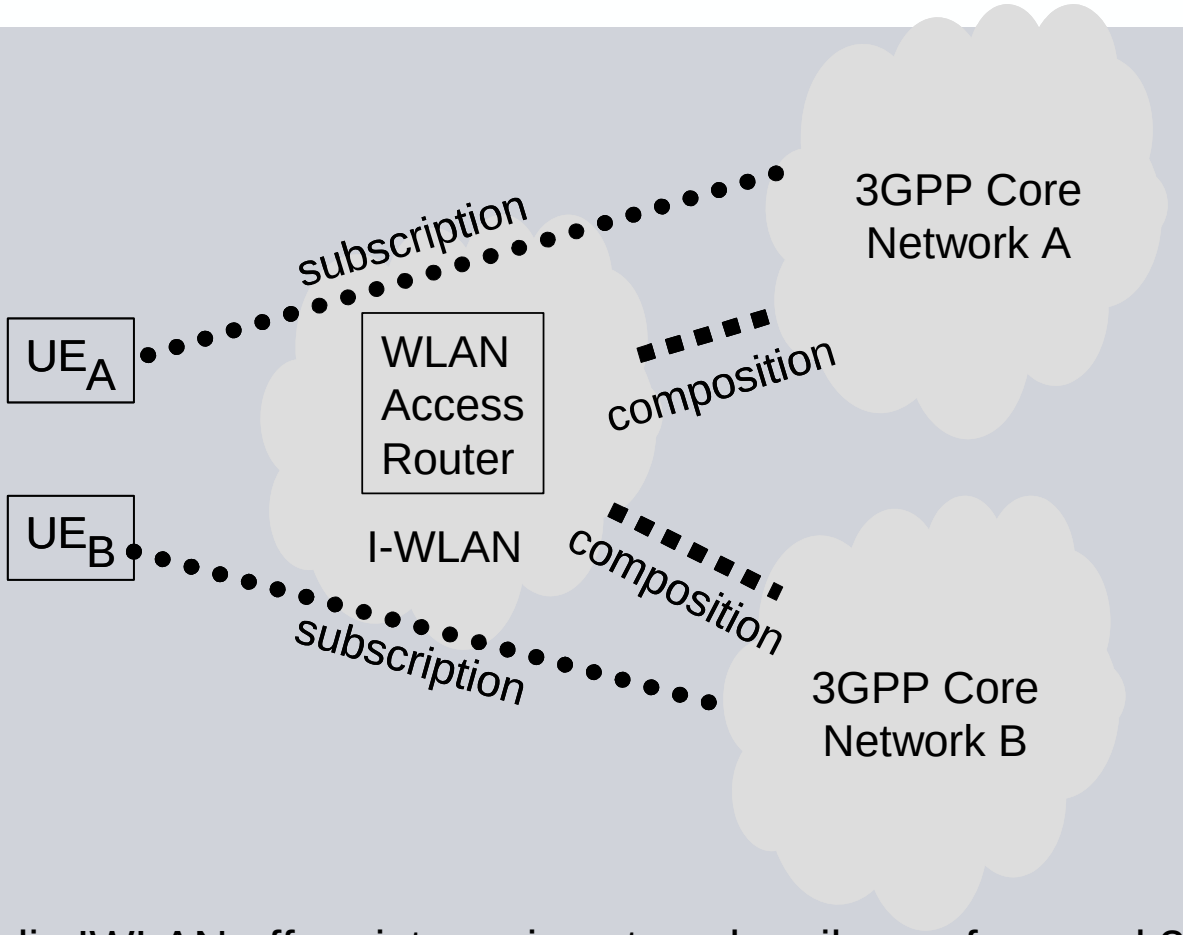
SIEMENS



- Business Case: Provisioning of IWLAN Services at mass events
  - IWLAN Provider move their equipment to Olympic Games, rock concerts,…
- Scenario description
  - On the site of the mass event, IWLAN uses e.g. DSL to connect to 3GPP network
  - IWLAN and 3GPP network authenticate each other based on pre-shared secret
    - E.g. 3GPP operator sells off-the-shelve „nomadic IWLAN packet“
      - including a „WLAN USIM“ to be inserted into the IWLAN Access Router
  - IWLAN and 3GPP network establish a secure bearer

Composition of a nomadic IWLAN – Scenario Extension

SIEMENS



- Nomadic IWLAN offers ist services to subscribers of several 3GPP networks
  - No pre-established trust between IWLAN and 3GPP network
    - E.g. trusted third party

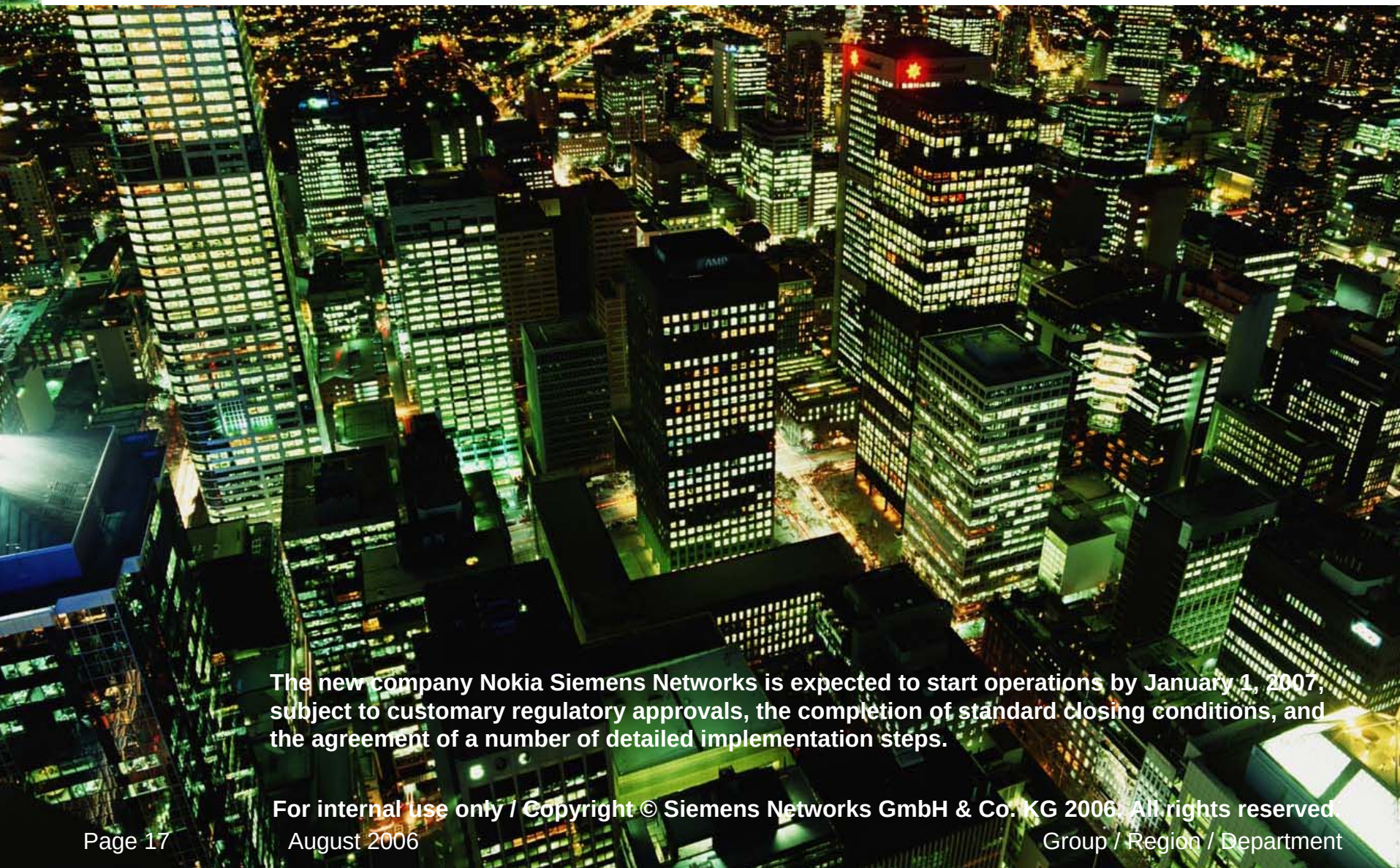
SIEMENS

Summary and Outlook

- Evolution of mobile networks:
  Increased Heterogeneity, Flexibility and Complexity
- SAE statically integrates heterogeneous access networks
- What could come after SAE
  - Flexible policy framework
    - Policy-based mobility management
    - Policy-based flow management
    - Policy-based charging
  - Dynamic configurability [Network Composition]
    - Charging self-configuration
    - Nomadic IWLAN

SIEMENS

Thank you for your attention!



The new company Nokia Siemens Networks is expected to start operations by January 1, 2007, subject to customary regulatory approvals, the completion of standard closing conditions, and the agreement of a number of detailed implementation steps.