Giving the world a new mobility:
Third Generation Mobile Networks from **SIEMENS**

Mobile Internet
"Internet-on-Air"

Kiritkumar P. Lathia

Charted Engineer, Fellow I.E.E.

VP - Strategy & Positioning
Siemens ICN S.p.A.
Italy

ITU-T SSG Vice Chairman

Contents

- *What is happening in the mobile world ?*

- *"Internet-mobility" or "Mobile-Internet"?*

- *How will IP be introduced into UMTS/IMT-2000 ?*

- *And beyond UMTS/IMT-2000 ?*

What is happening in the mobile world ?

"Internet-mobility" or "Mobile-Internet"?

How will IP be introduced into UMTS/IMT-2000 ?

And beyond UMTS/IMT-2000 ?

03.10.2001

ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001

© Siemens AG 2001

Information and
Communications

3

A Changing World - Economic Megatrends:

■ **The Internet Phenomenon (e- and m-commerce)**

■ **From Monopoly to brutal Competition and new players**

■ **From Subscribers to Customer Relationship Management**

■ **From Technology to Services and Applications**

■ **Personalisation of services but "Mass Market of One"**

■ **From Manufacturing to Knowledge Economy**

Telecommunications business environment

Return on investment

20 years ✎ 7 years backbone network

3 years access network

0 years terminals (now a consumer product)

New User expectations

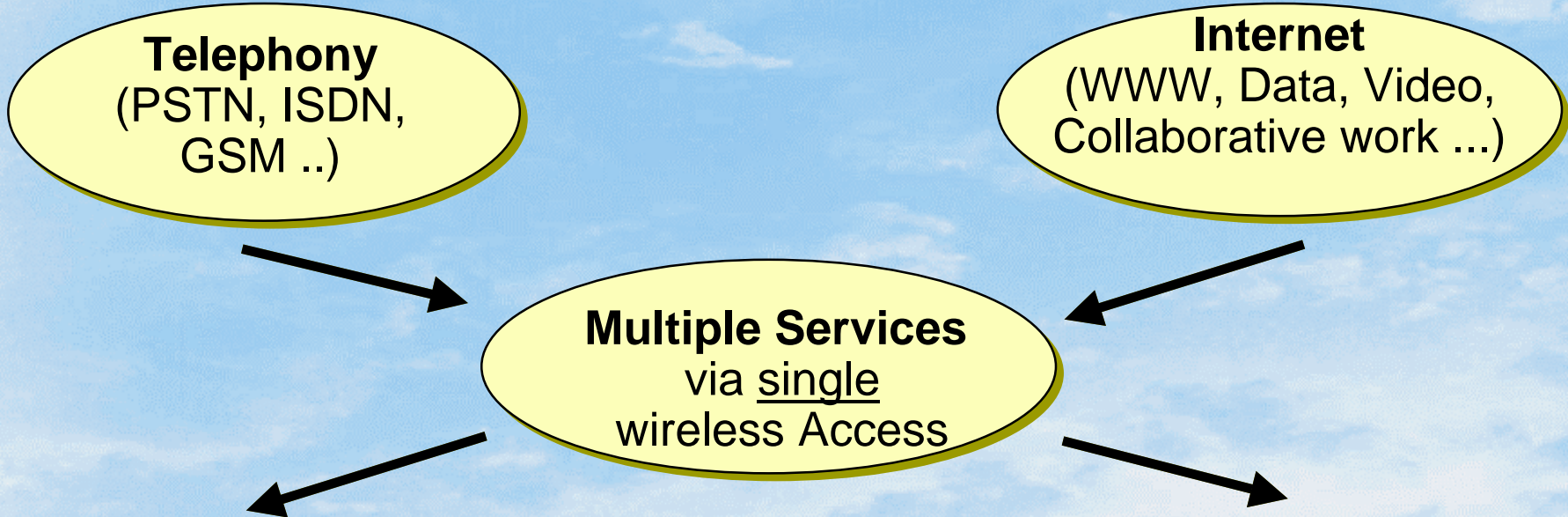users looking for services & ease of use, rather than technology

Regulatory environment

- liberalisation

- price cap

- competition between standards

Fundamental global structural changes towards short-term shareholder Return-On-Investments. Where does standardization fit in this?
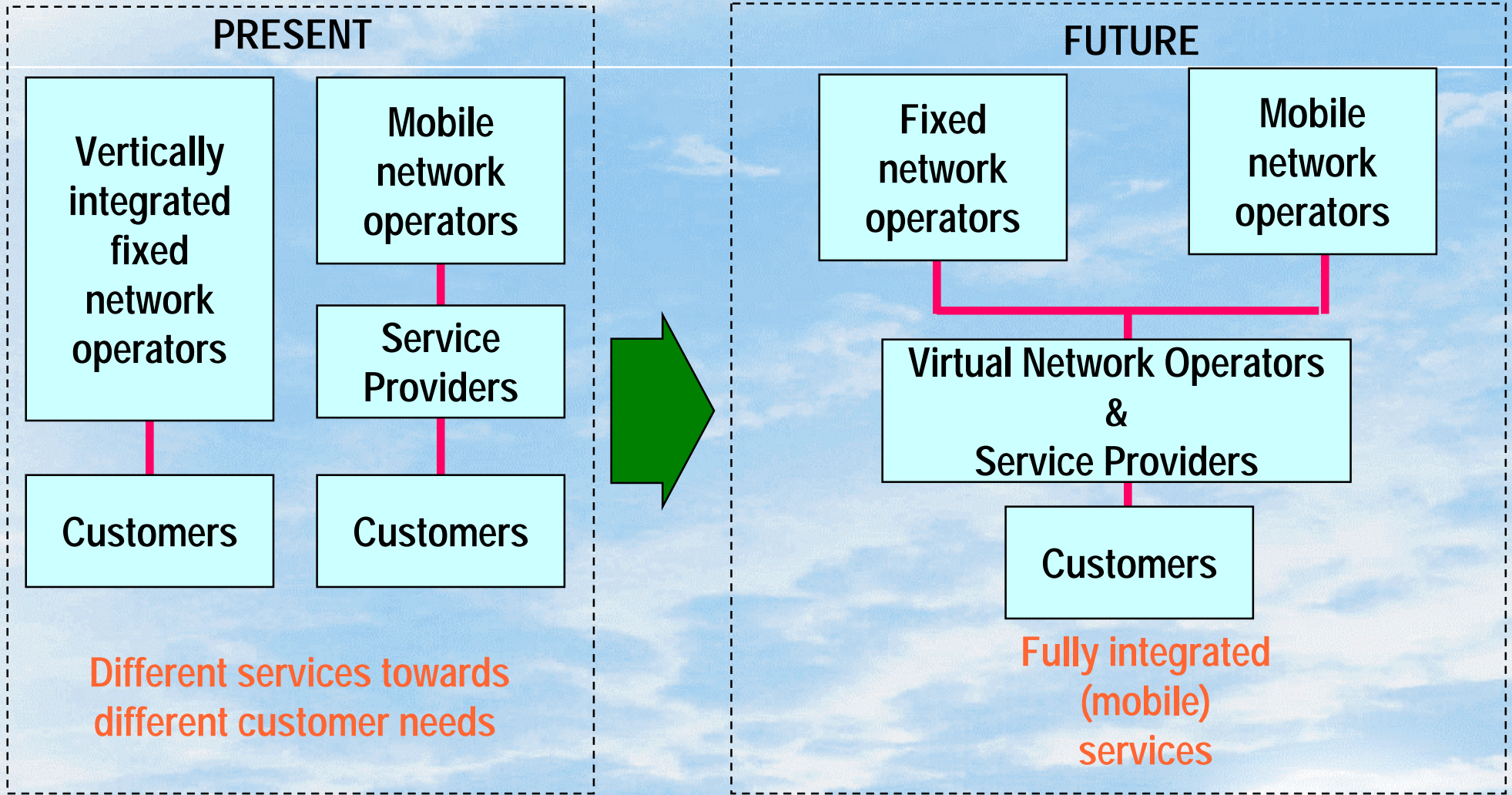
Network Convergence - the challenge

Telephony
(PSTN, ISDN, GSM ..)

Internet
(WWW, Data, Video, Collaborative work ...)

Multiple Services
via <u>single</u>
wireless Access

Technical Challenges:
Provide Higher Bandwidth
Converged Networks

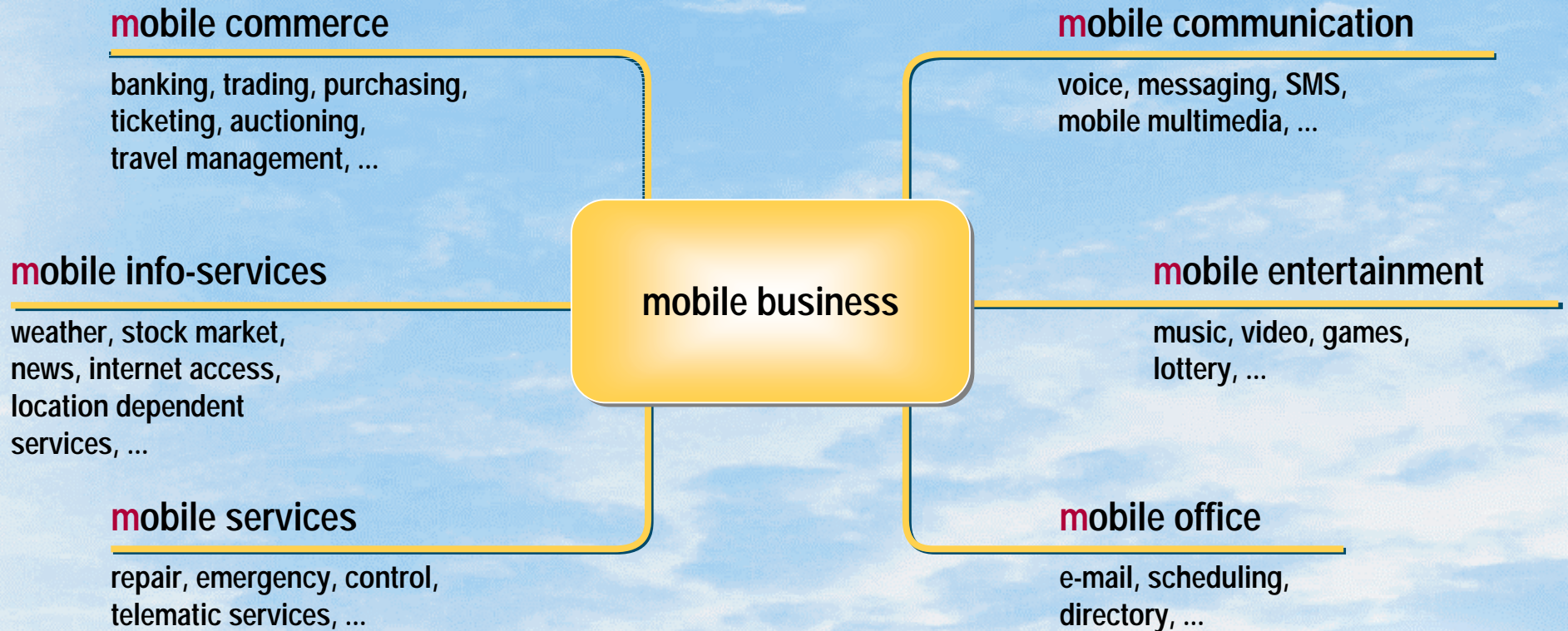**Economic Challenges:**
Low Investment Costs
Reduced Life Cycle Costs

Trends

PRESENT

FUTURE

Vertically integrated fixed network operators

Mobile network operators

Service Providers

Customers

Customers

Fixed network operators

Mobile network operators

Virtual Network Operators & Service Providers

Customers

Different services towards different customer needs

Fully integrated (mobile) services

ITU "Sub-Regional Seminar on IMT-2000" Warsaw, 2-4 October, 2001

© Siemens AG 2001

Information and Communications

7

Innovative mobile services - key factor for new revenue
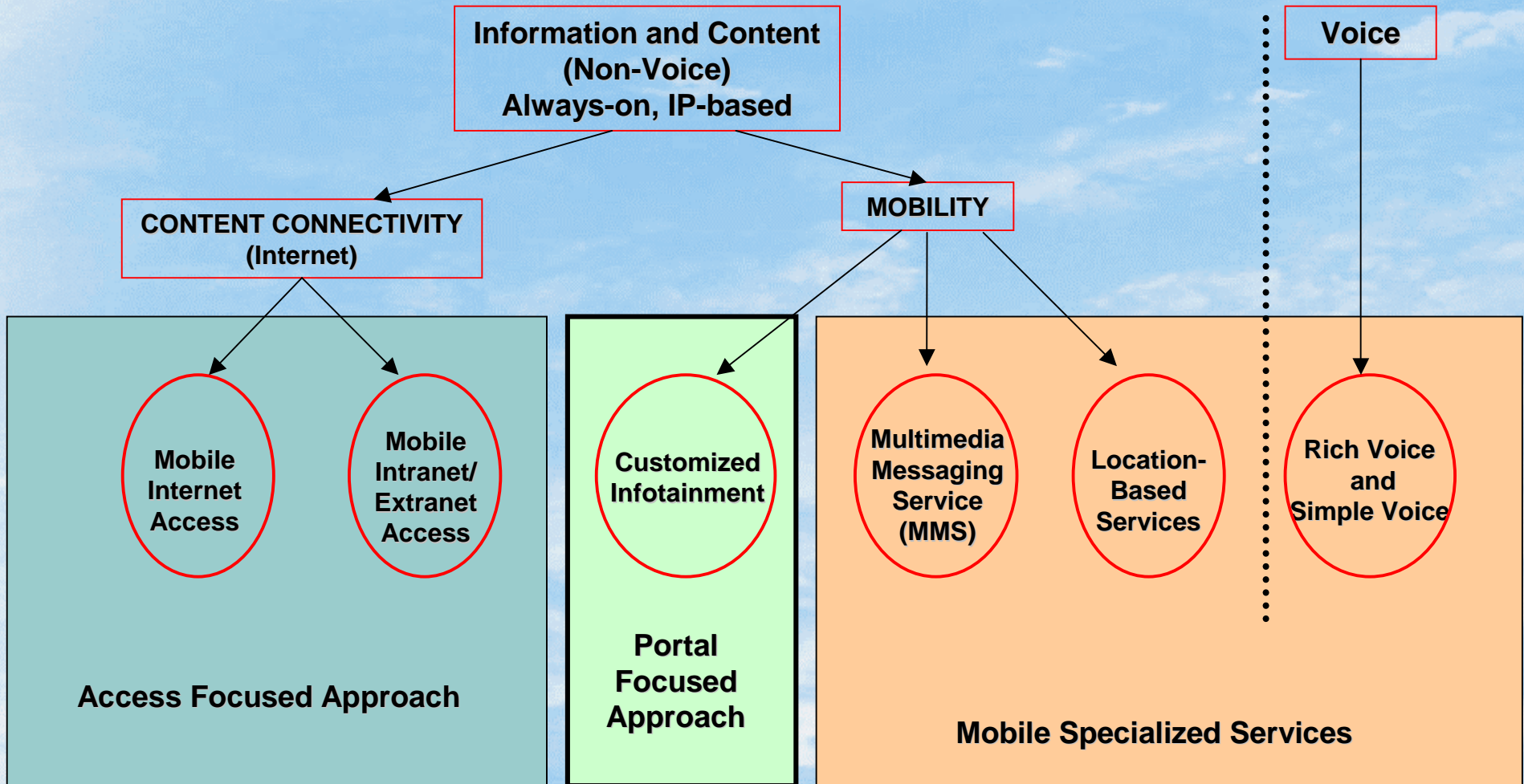## Examples of attractive mobile services and applications

mobile commerce

banking, trading, purchasing,
ticketing, auctioning,
travel management, ...

mobile communication

voice, messaging, SMS,
mobile multimedia, ...

mobile info-services

weather, stock market,
news, internet access,
location dependent
services, ...

mobile business

mobile entertainment

music, video, games,
lottery, ...

mobile services

repair, emergency, control,
telematic services, ...

mobile office

e-mail, scheduling,
directory, ...

Source: ICM CA CV / CTO

© Siemens AG 2001

Innovative mobile services - Another view
(source: UMTS Forum)

```
Information and Content
(Non-Voice)
Always-on, IP-based                          Voice

        CONTENT CONNECTIVITY              MOBILITY
            (Internet)

                            PERSONAL   PEOPLE        LOCATION
                                       CONNECTIVITY

                            Direct Link              Knowledge
                            to a Person              of Location

  Mobile      Mobile      Customized   Multimedia   Location-    Rich Voice
  Internet    Intranet/   Infotainment Messaging    Based        and
  Access      Extranet                 Service      Services     Simple Voice
              Access                   (MMS)
```
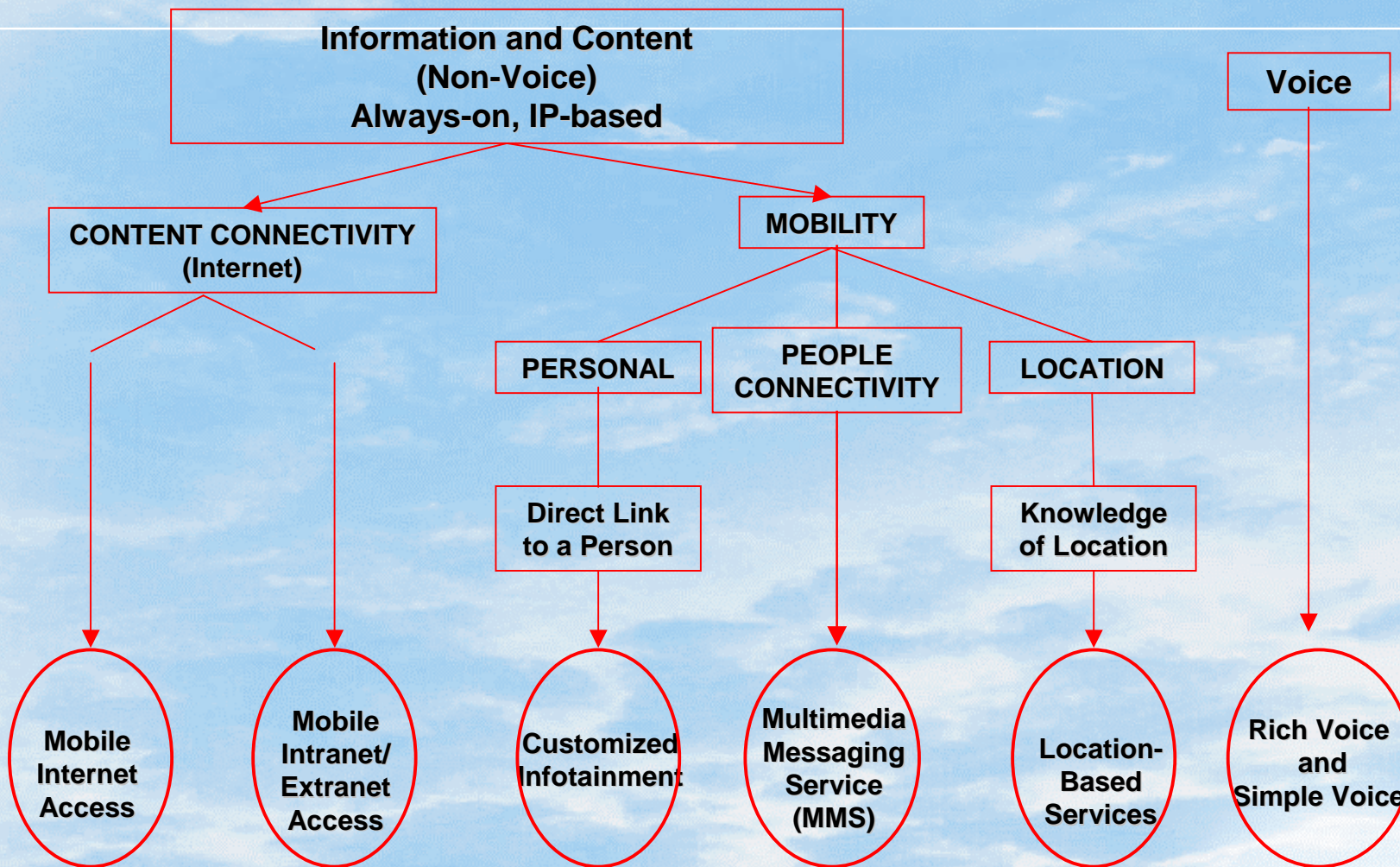
Innovative mobile services - Delivery mechanisms
(source: UMTS Forum)

Information and Content (Non-Voice) Always-on, IP-based

Voice

CONTENT CONNECTIVITY (Internet)

MOBILITY

Mobile Internet Access

Mobile Intranet/ Extranet Access

Customized Infotainment

Multimedia Messaging Service (MMS)

Location-Based Services

Rich Voice and Simple Voice

Access Focused Approach

Portal Focused Approach

Mobile Specialized Services

Air interface & asymmetric data service requirements

no 64 kbps limit

always on

flexible data rates

flat rate

?
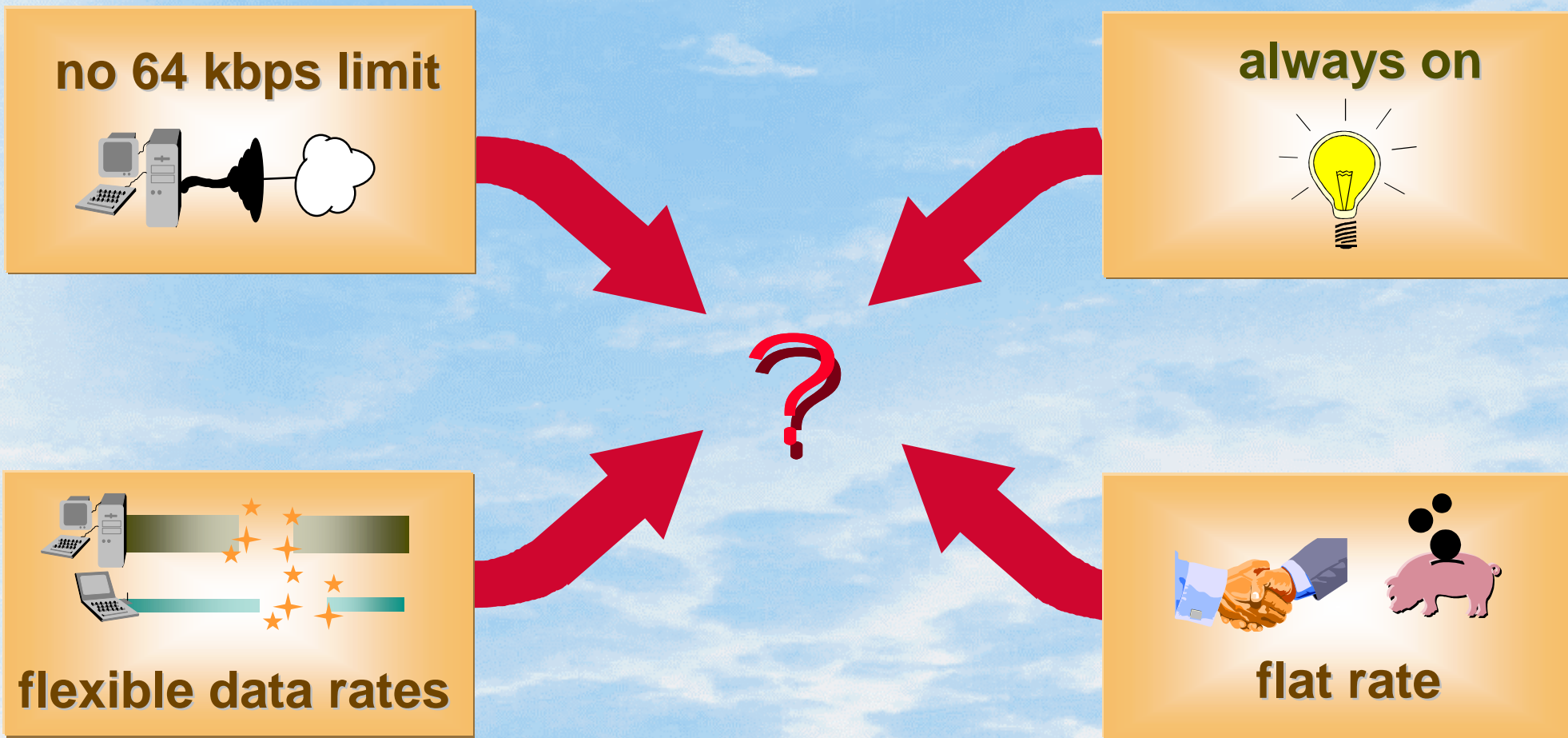
Multimedia Services & TDD

City on Air

Medic on Air

m-Commerce

Remote Service

Email

Games

DL   UL

TDD can be perfectly matched to this asymmetry without wasting system capacity.

ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001

© Siemens AG 2001

The Internet goes mobile

- **1999: SMS generates 10% revenue of an operator**
- **Early 2000: WAP deployed in most of the networks**
- **End 2000: GPRS starts commercial service**
- **Focus on Business User Segment at the beginning**
- **2001: GPRS will push SMS and WAP to mass market**
- **2002: UMTS will integrate voice/data/video services**

Mobile E-Mail
Mobile E-Commerce
Mobile Internet Service Provider
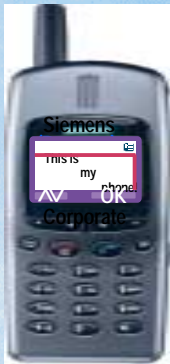Mobile Intranet Access
Mobile Entertainment
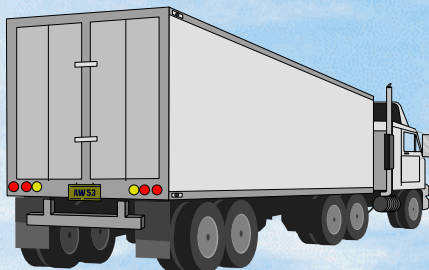
Dedicated terminals will drive additional penetration

Mobile computing equipment

- **Heavy nomadic users with high bandwidth demand**
- **WWW, Internet/Intranet access, unified multimedia messaging**

Mobile Smart Phone

- **Highly mobile users with moderate bandwidth demand**

- **WAP, Java, info services, Location dependant services, payment, ...**

Data only Terminal

- **occasional transfer**

- **Fleet Management, Telematic, Telemetric, ...**

What is happening in the mobile world ?

"Internet-mobility" or "Mobile-Internet"?

How will IP be introduced into UMTS/IMT-2000 ?

And beyond UMTS/IMT-2000 ?

**ITU "Sub-Regional Seminar on IMT-2000"
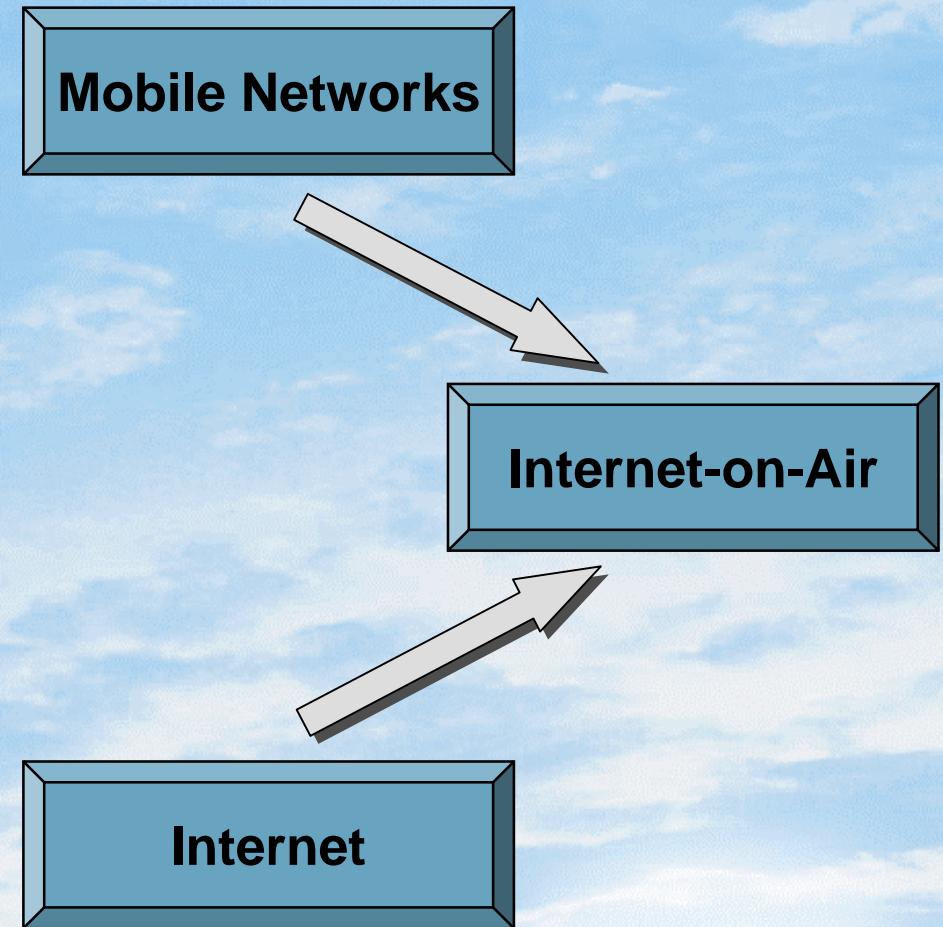Warsaw, 2-4 October, 2001**

© Siemens AG 2001

Internet-on-Air
The Evolution Target of Mobile Networks and Internet

Evolution Path of Mobile Networks:

 Use IP transport in the backbone.

 Transport voice & data over IP.

 Push IP into the RAN.

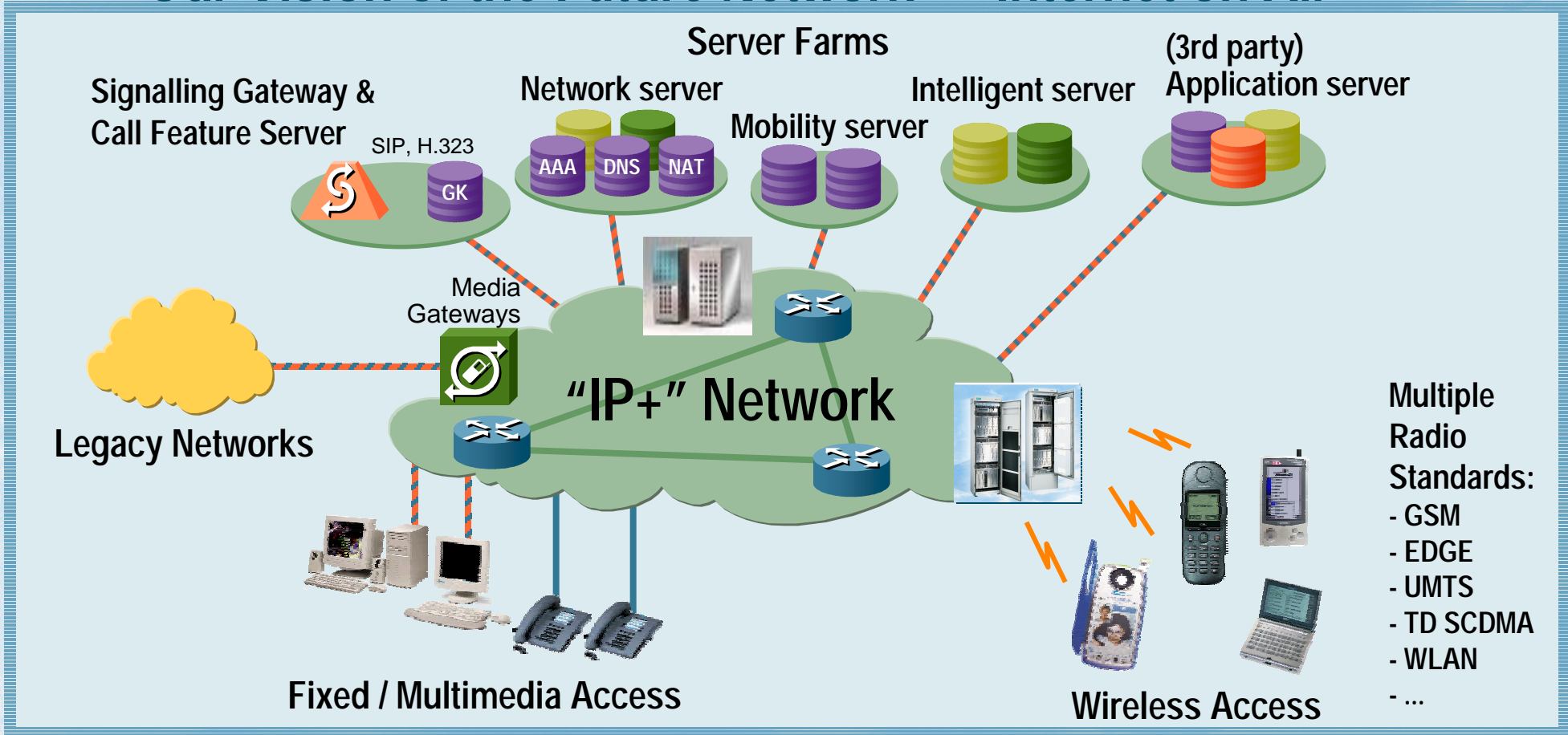 Terminate IP in the mobile host.

Evolution Path of the Internet:

 Enable wireless access.

 Support user & terminal mobility.

 Go beyond "Best Effort".

 Provide Security and AAA.

Mobile Networks

Internet-on-Air

Internet

3G goes IP:

Our Vision of the Future Network – Internet on Air

Server Farms

Signalling Gateway &
Call Feature Server

SIP, H.323

Network server

(3rd party)
Application server

Intelligent server

Mobility server

GK

AAA   DNS   NAT

Media
Gateways

"IP+" Network

Legacy Networks

Multiple
Radio
Standards:
- GSM
- EDGE
- UMTS
- TD SCDMA
- WLAN
- ...

Fixed / Multimedia Access

Wireless Access

03.10.2001

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001

Information and
Communications

18

IP – the Unifier

Hides the Network Infrastructure from the Applications

WWW	E-Mail	VoIP	Mobile Commerce	...

IP

Internet	PSTN	PLMN	Corporate Network
	Switch		
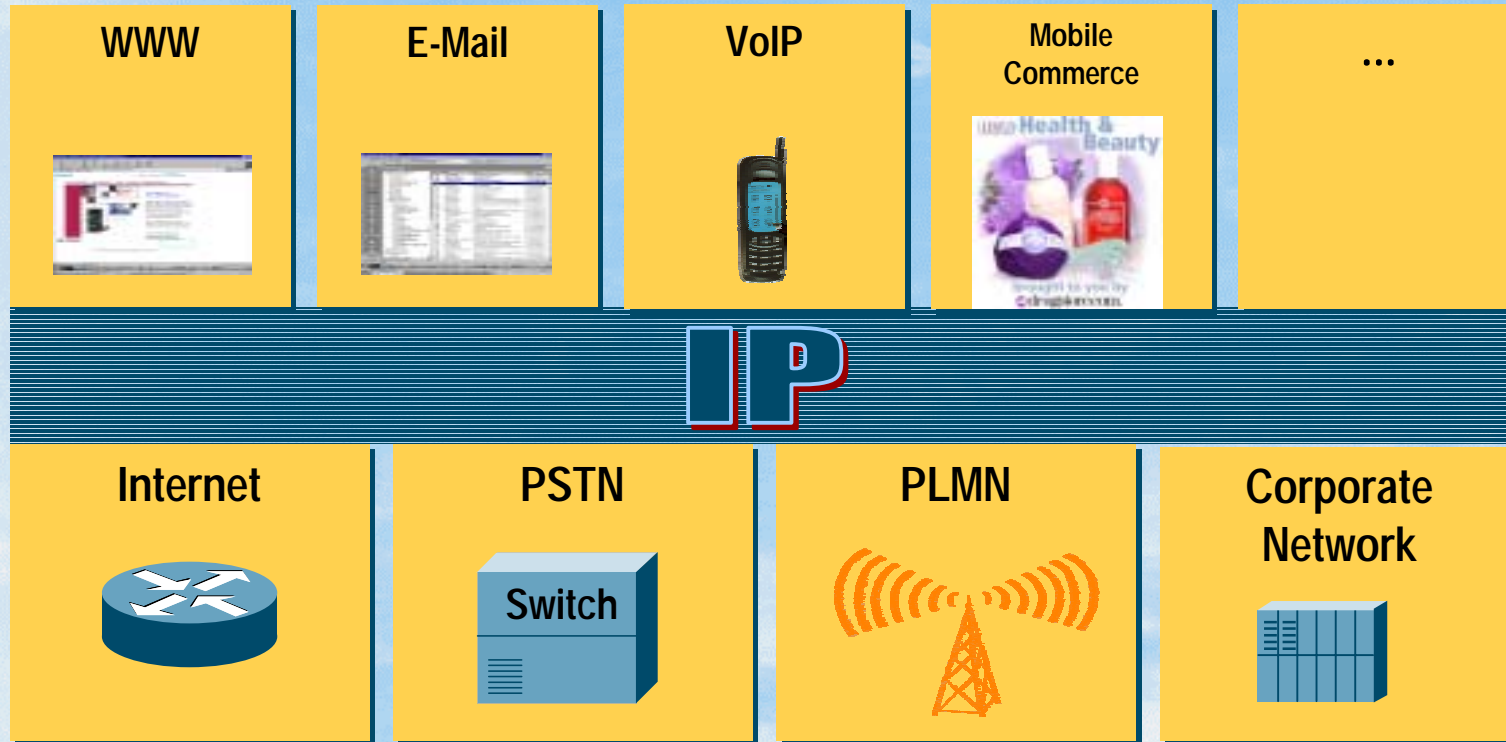
Anything over IP
IP facilitates usage of applications across network boundaries (write once - use many times)

IP over Anything
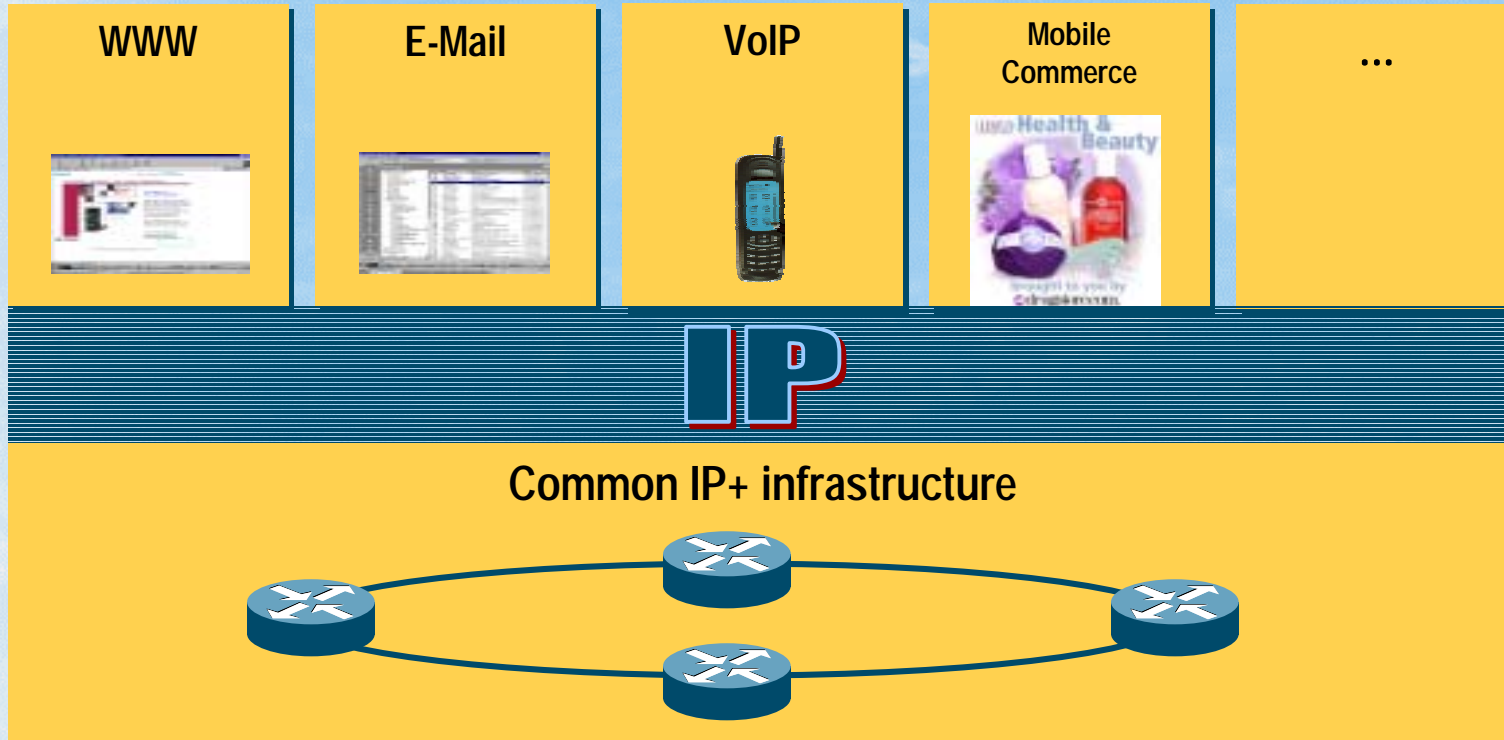A common IP layer harmonises networks and provides internetworking over different network technologies

Unified provisioning of IP applications

IP – the Unifier

Opens the Door to a Unified IP Infrastructure

WWW

E-Mail

VoIP

Mobile Commerce

...

IP

Common IP+ infrastructure

Interworking
with non-IP networks
via media gateways
or mediation devices

**Reduction of complexity and cost
due to unified IP infrastructure**

Characteristics of the UMTS "Internet on Air" Network

- End-to-End IP, Internet compliant (IETF, W3C, DMTF).
  - Enhancements where necessary to enable mobility. Design is based on IPv6.
- Support end-to-end multi-media communication over heterogeneous networks.
- Use TCP/IP as a common framework for multimedia communication.
- Enable global mobility.
- Access over many different networks (wireless & wireline).
- Interworking with existing (legacy) networks.
- Provisions for allocation and management of network resources.
- Voice is only one possible application, although an important benchmark.

Clear split between transport network and applications.

Mobile Wireless Internet Forum – MWIF:

MWIF Mission Statement:

Drive an open internet-based architecture that:

enables seamless integration of mobile telephony
and IP-based services (voice, data, video, web, etc.)
for the mobile wireless networks

and

is independent of the Air Interface

Mobile Wireless Internet Forum – MWIF: Layered Functional Architecture (proposal under discussion)
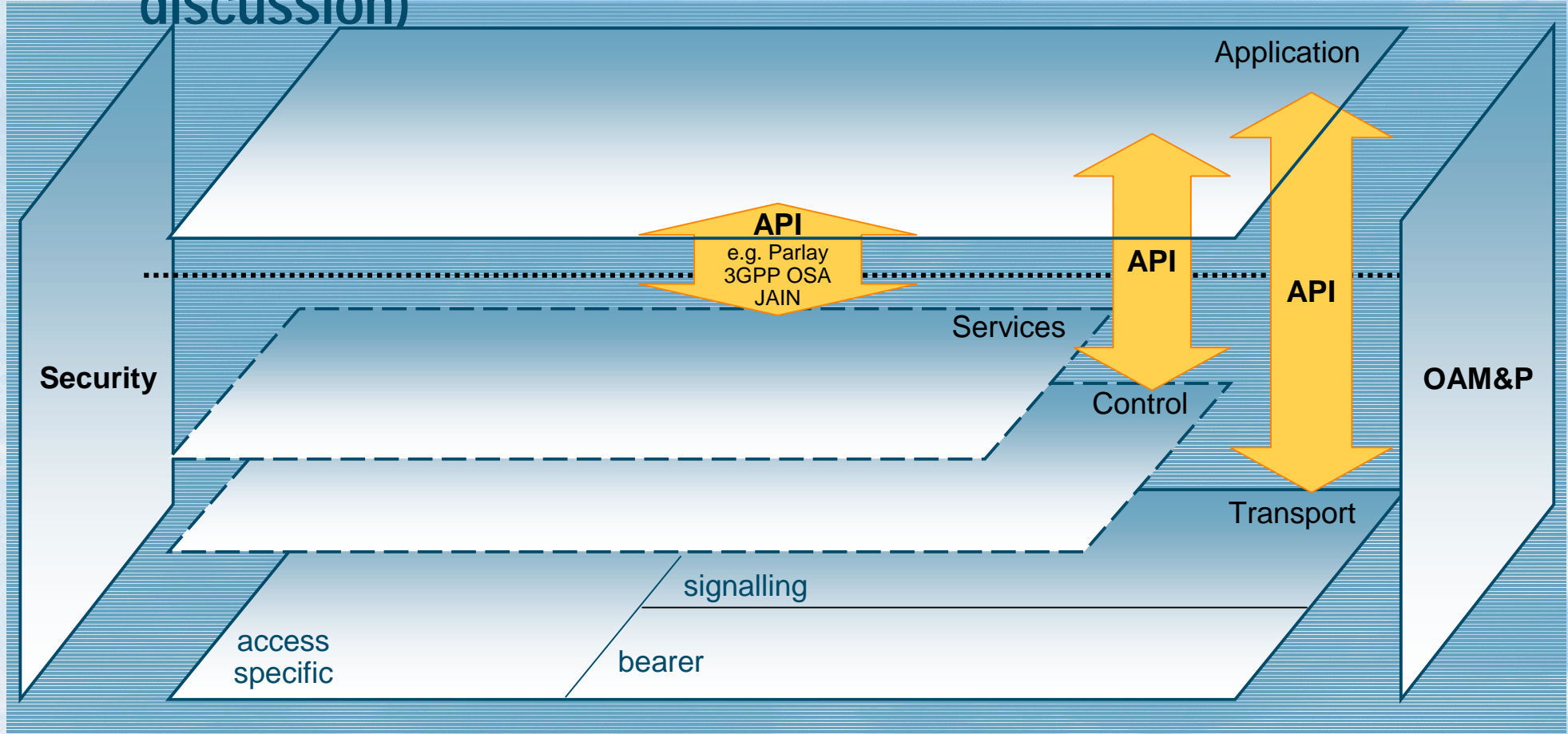
© Siemens AG 2001

What is happening in the mobile world ?

"Internet-mobility" or "Mobile-Internet"?

How will IP be introduced into UMTS/IMT-2000 ?

And beyond UMTS/IMT-2000 ?

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001

Network Evolution
Today: GSM / GPRS deployment

HLR

SCP LNP

IN

MSC

MSC

BTS

BSC

TDM / ATM

CS domain

PSTN
PLMN

SGSN

GGSN

ATM

PO domain

Internet

Access

OSS

Information and Communications
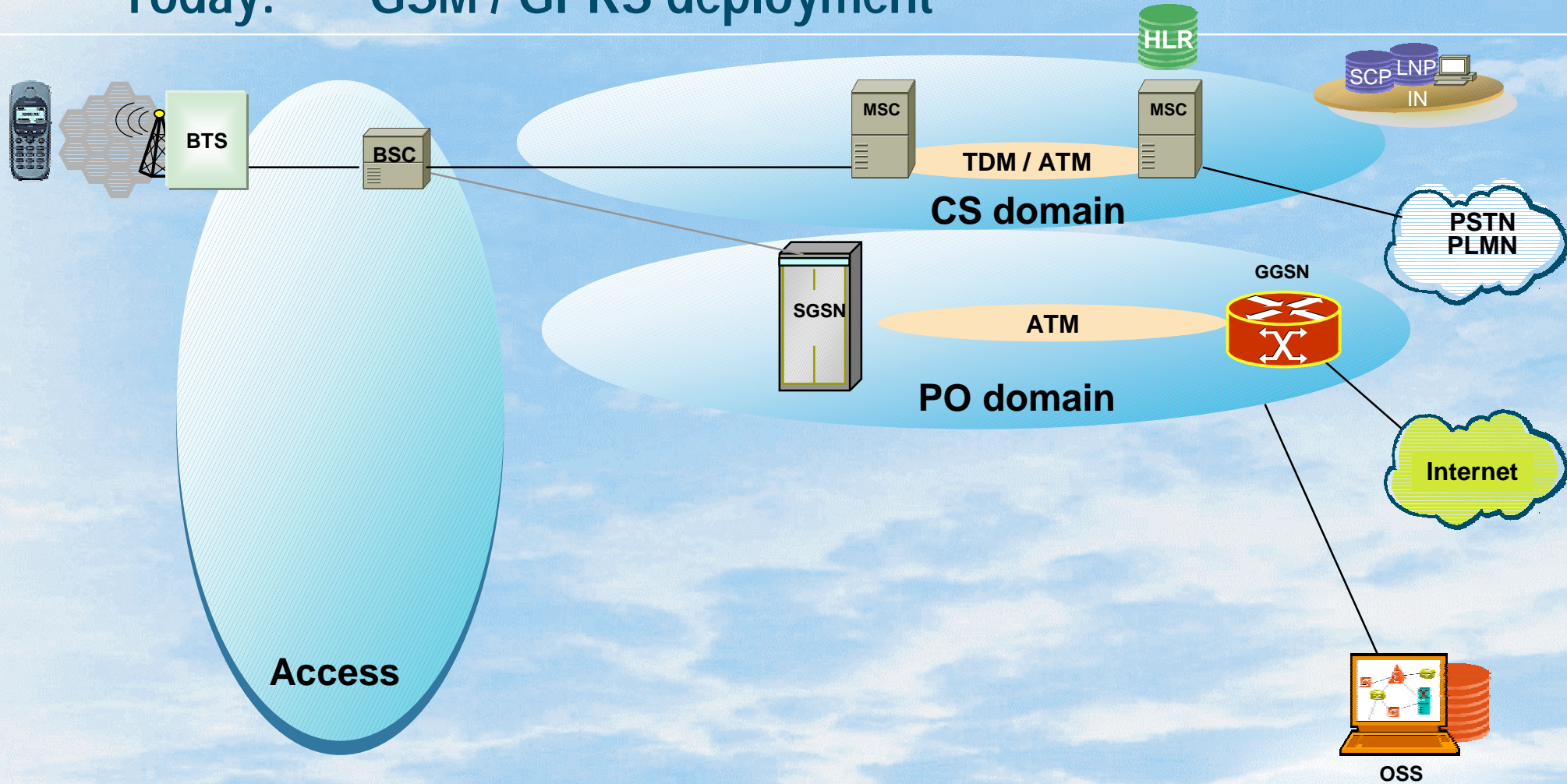
Network Evolution
Step 1:   Introduction of UMTS

iHLR   AAA

SCP LNP   IN

BTS

BSC

MSC

MSC

TDM / ATM

CS domain

PSTN PLMN

Node B

RNC

SGSN

ATM

GGSN

PO domain

Internet

Access

OSS

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001
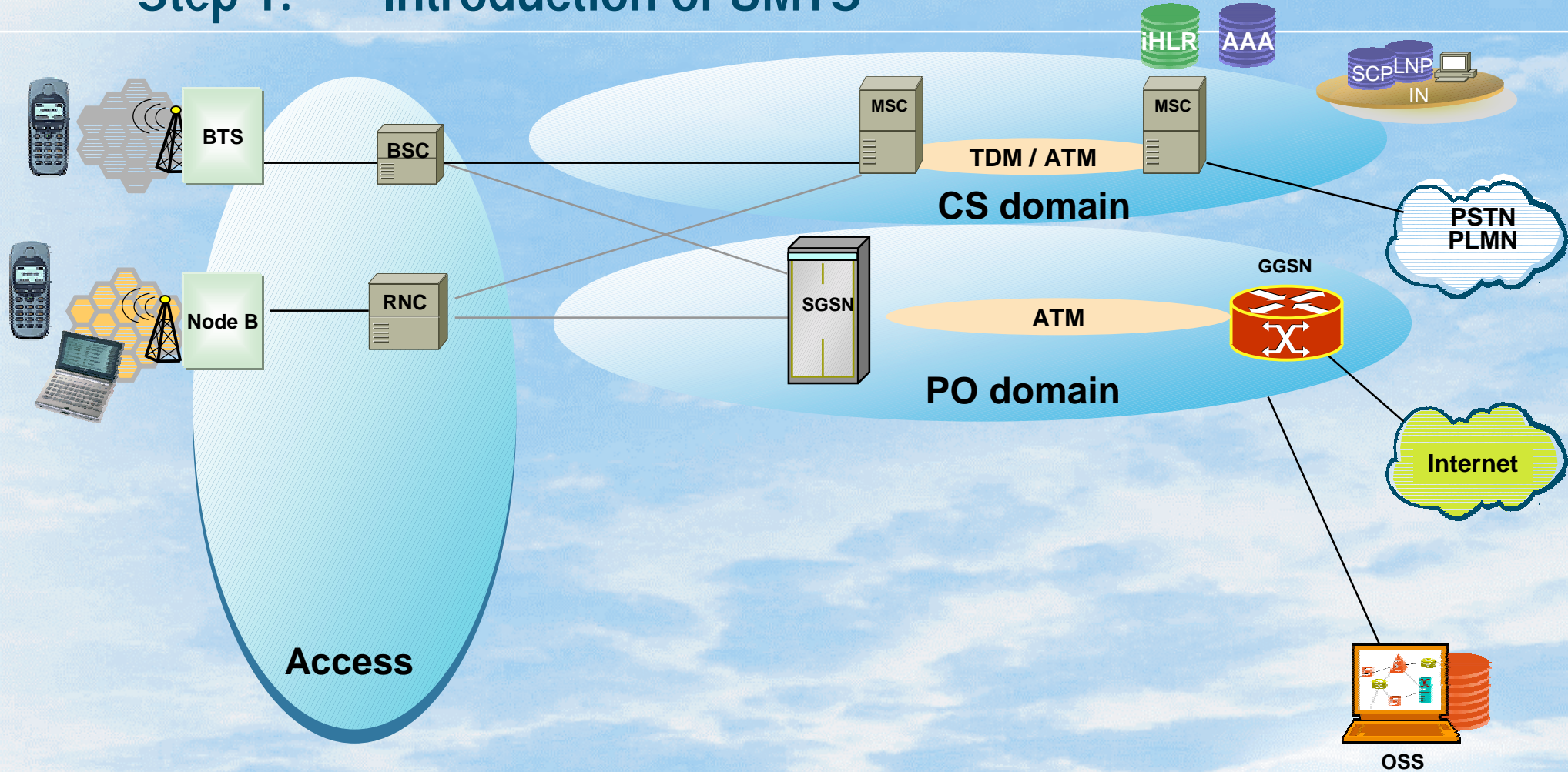
Network Evolution
step2:   Introduction of IP backbone

SCP LNP

IN

BTS

BSC

MSCS   TDM / ATM / IP   MSCS

CS domain

PSTN
PLMN

Node B

RNC

SGSN

GGSN

PO domain

Internet

Core Router

Backbone

Access

iHLR

AAA

OSS
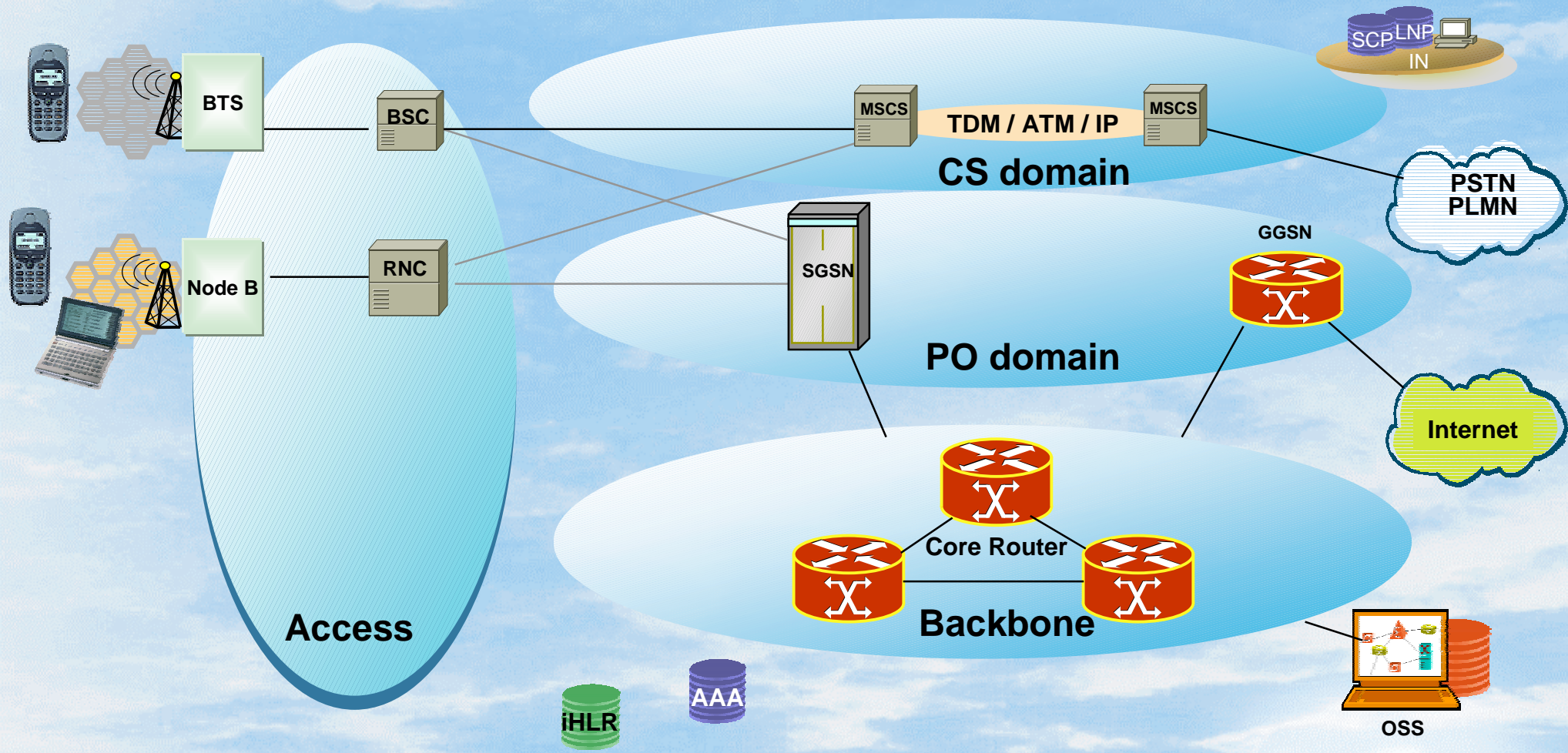
Network Evolution
Step 3:   IP in the Radio Access

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001
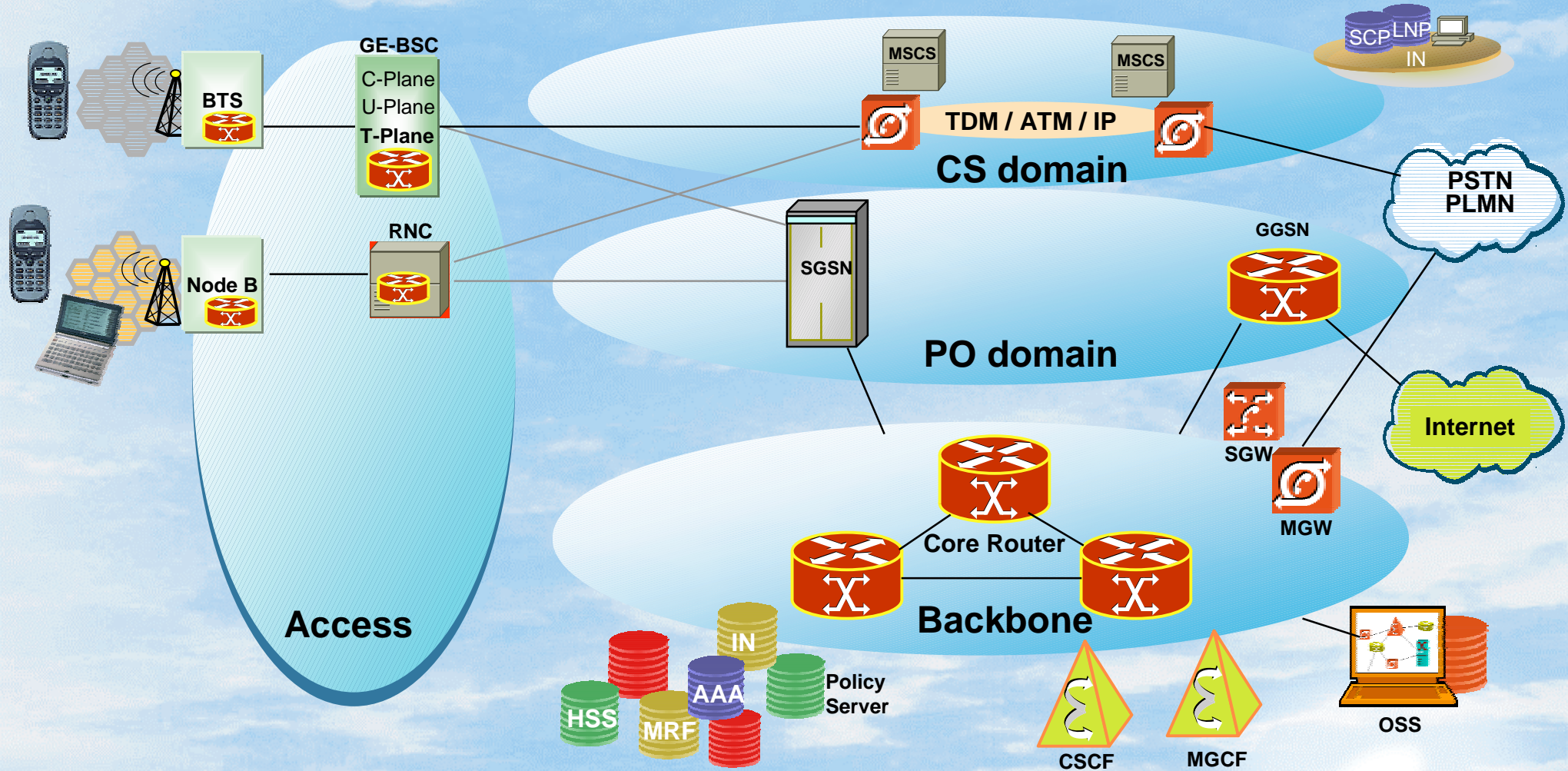
Network Evolution
Step 4:   IP-based Radio Access Solution

03.10.2001

ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001

© Siemens AG 2001

Information and
Communications

29
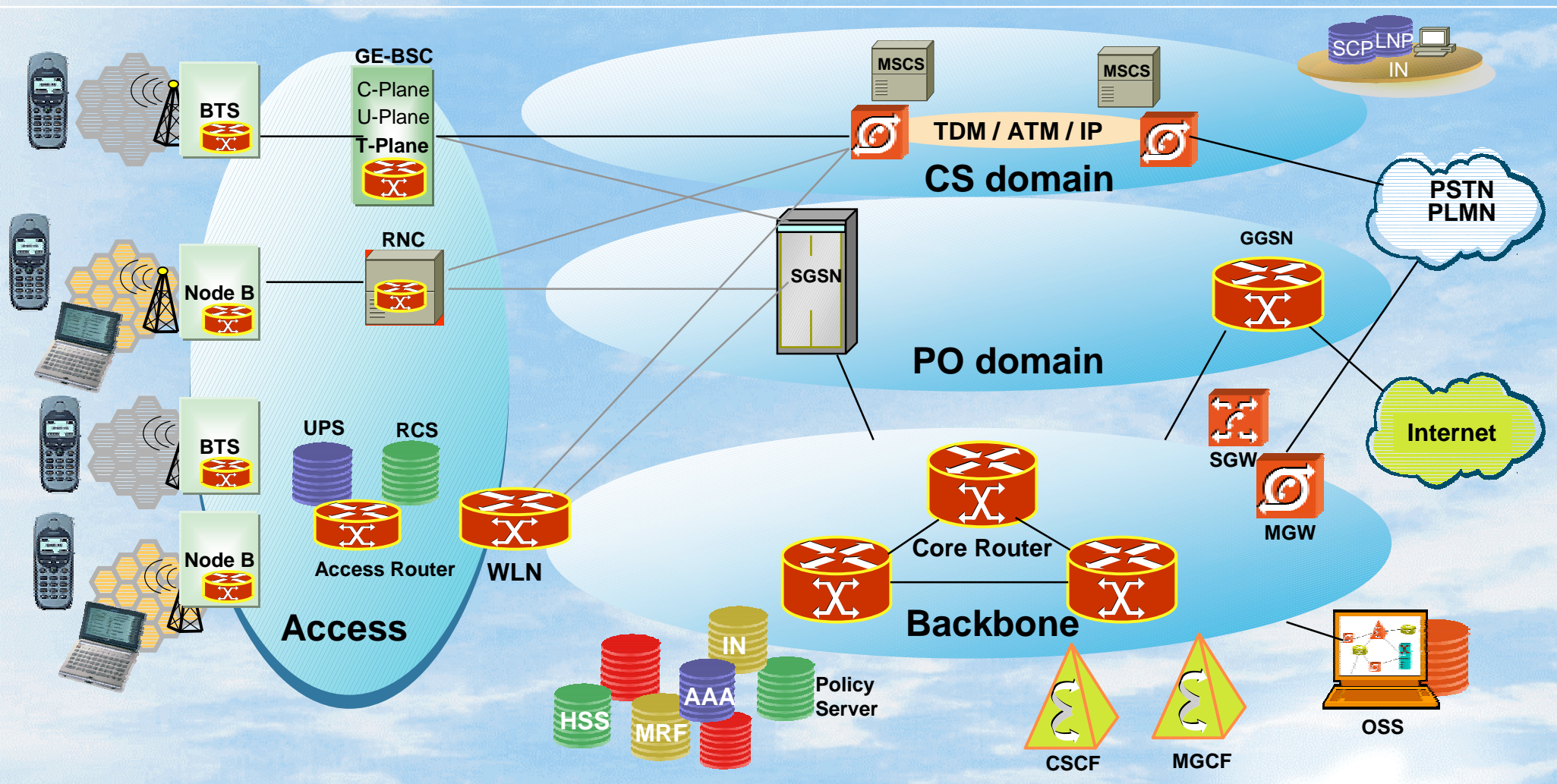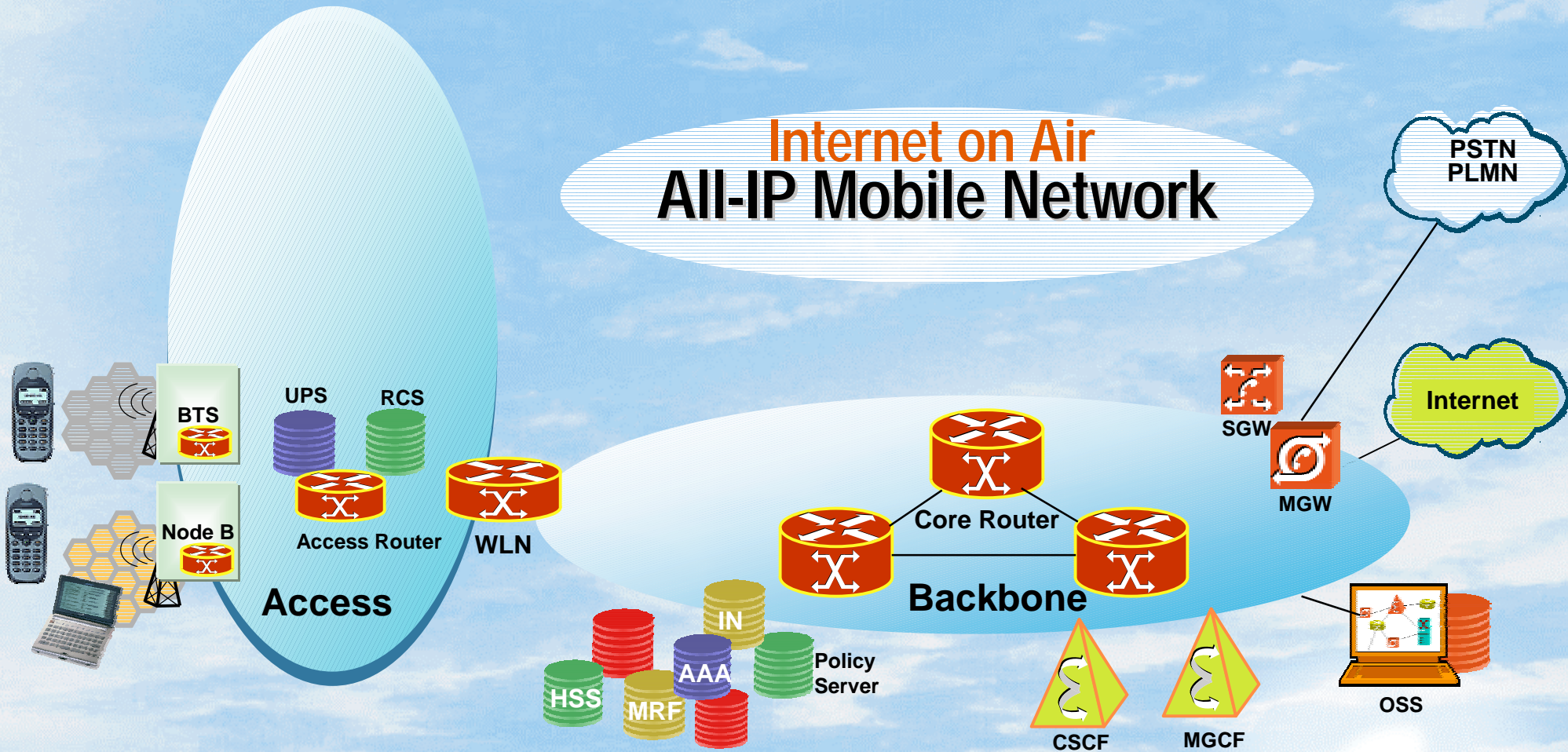
The Options:
"All Roads Lead to Rome" – The Operator has the Choice which one to Take

Common technology in radio access and core network

Core

Release >5

IP transport also for real time/voice

UTRAN

Release 4 + 5   Evolution

UMSC

GSM/
GPRS   higher data rates

UTRAN

Release 99

Revolution ?

Internet on Air

The chosen steps depend on: Regulatory Issues
Existing Equipment
Service Strategy
Terminal Availability

What is happening in the mobile world ?

"Internet-mobility" or "Mobile-Internet"?

How will IP be introduced into UMTS/IMT-2000 ?

And beyond UMTS/IMT-2000 ?

03.10.2001

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001

**Information and
Communications**

32

Evolution of Mobile Communication Systems

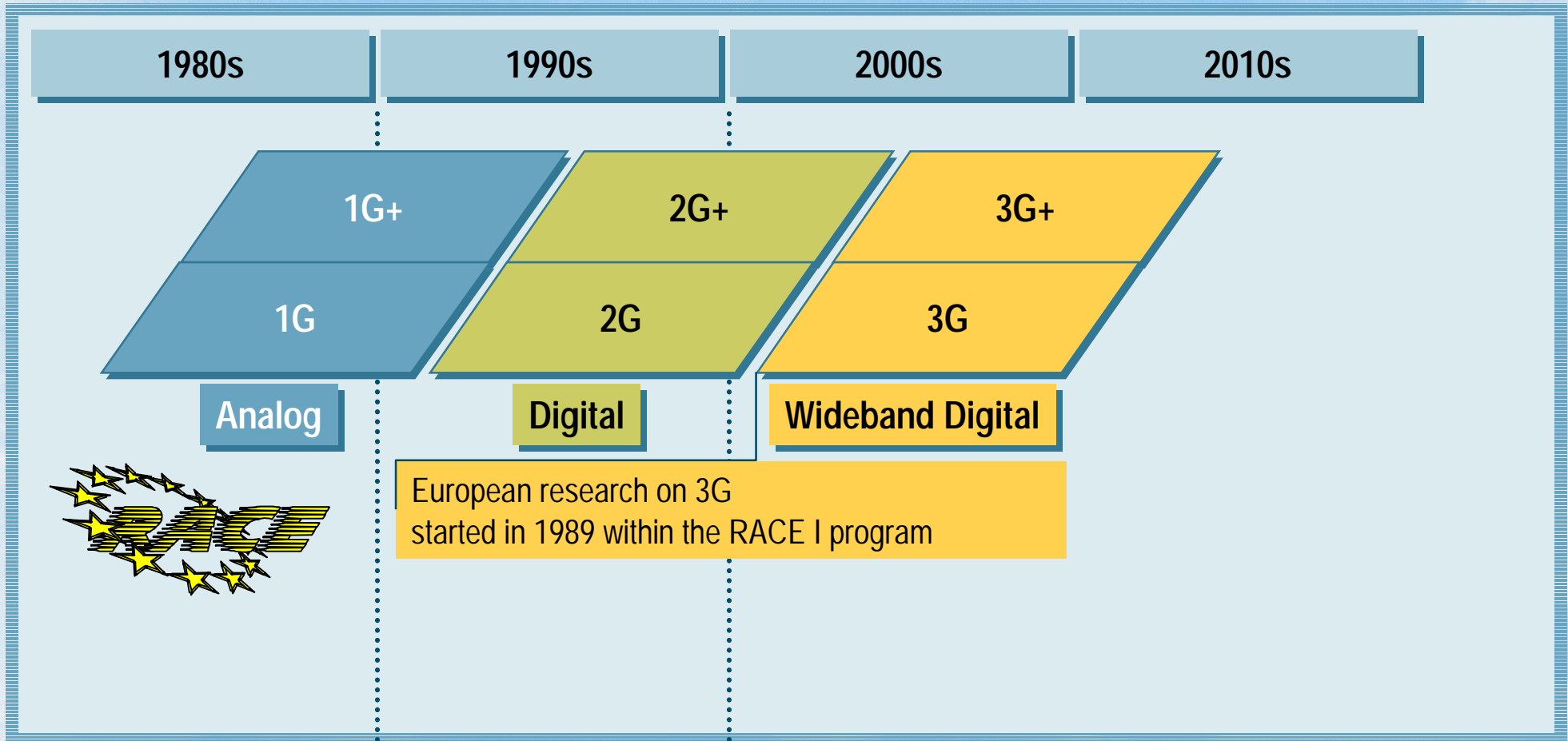| 1980s	1990s	2000s	2010s

1G+   **2G+**   **3G+**

1G   **2G**   **3G**

Analog   **Digital**   **Wideband Digital**

European research on 3G
started in 1989 within the RACE I program

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001

Information and Communications   33

Evolution of Mobile Communication Systems TAKES TIME
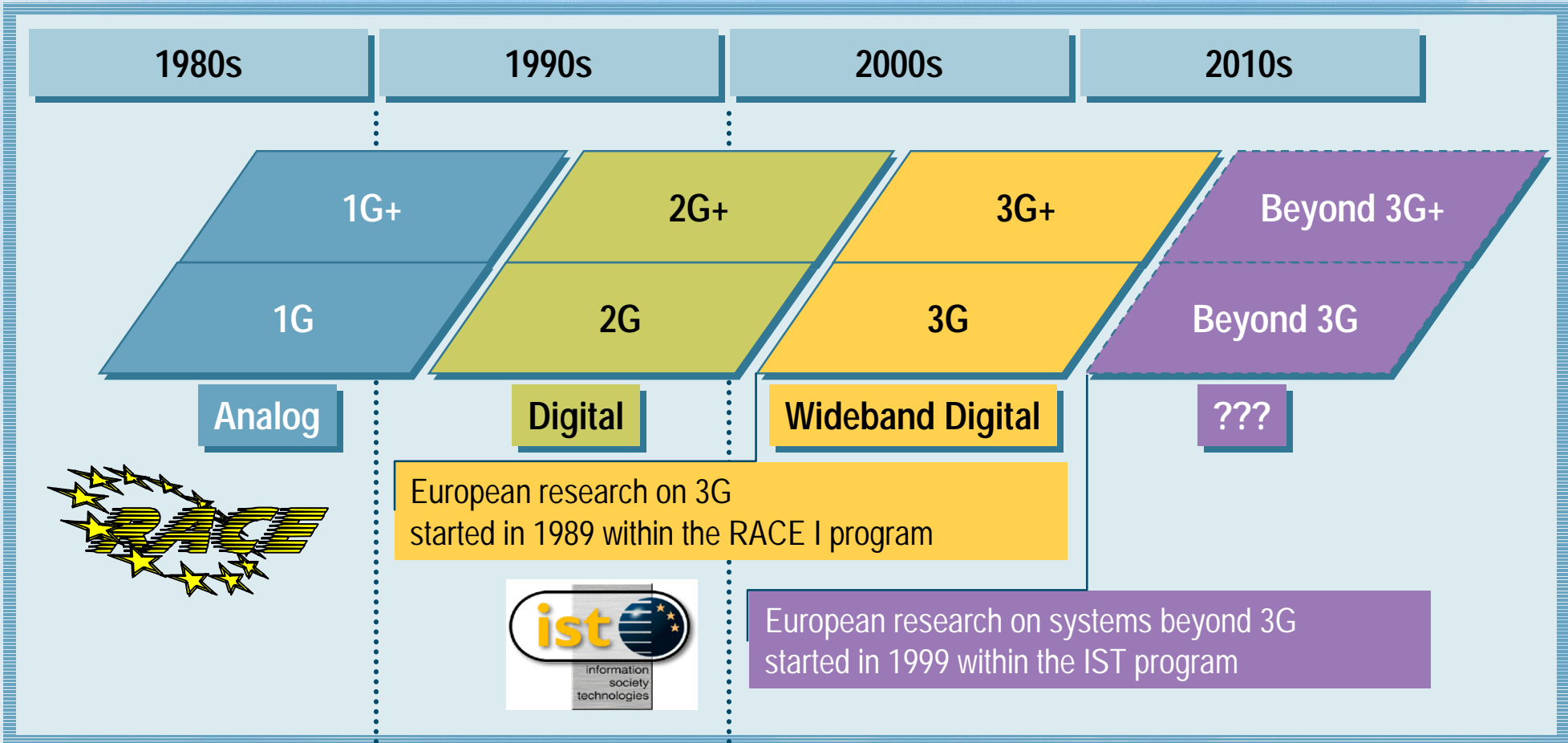
1980s	1990s	2000s	2010s
1G+	2G+	3G+	Beyond 3G+
1G	2G	3G	Beyond 3G
Analog	Digital	Wideband Digital	???

European research on 3G
started in 1989 within the RACE I program

European research on systems beyond 3G
started in 1999 within the IST program

A Complete Portfolio of
Specialized Radio Solutions is Required

■ Mobile radio access networks are designed to meet certain maximum requirements for grade of mobility and range

■ WLAN are designed for high data rates, low ranges and generally low mobility

Mobility & Range

Third generation (IMT-2000, TD-SCDMA, UMTS ...)

High Speed
Vehicular
Rural
Vehicular
Urban

GSM

Pedestrian

Indoor

IEEE 802.11a

Fixed urban

DECT

BRAN
Hiperlan2

BRAN
Hiperaccess

Personal Area

BlueTooth

0.5   2   20   155 Mb/s

Total data rate per cell

**ITU "Sub-Regional Seminar on IMT-2000"
Warsaw, 2-4 October, 2001**

© Siemens AG 2001

**Information and
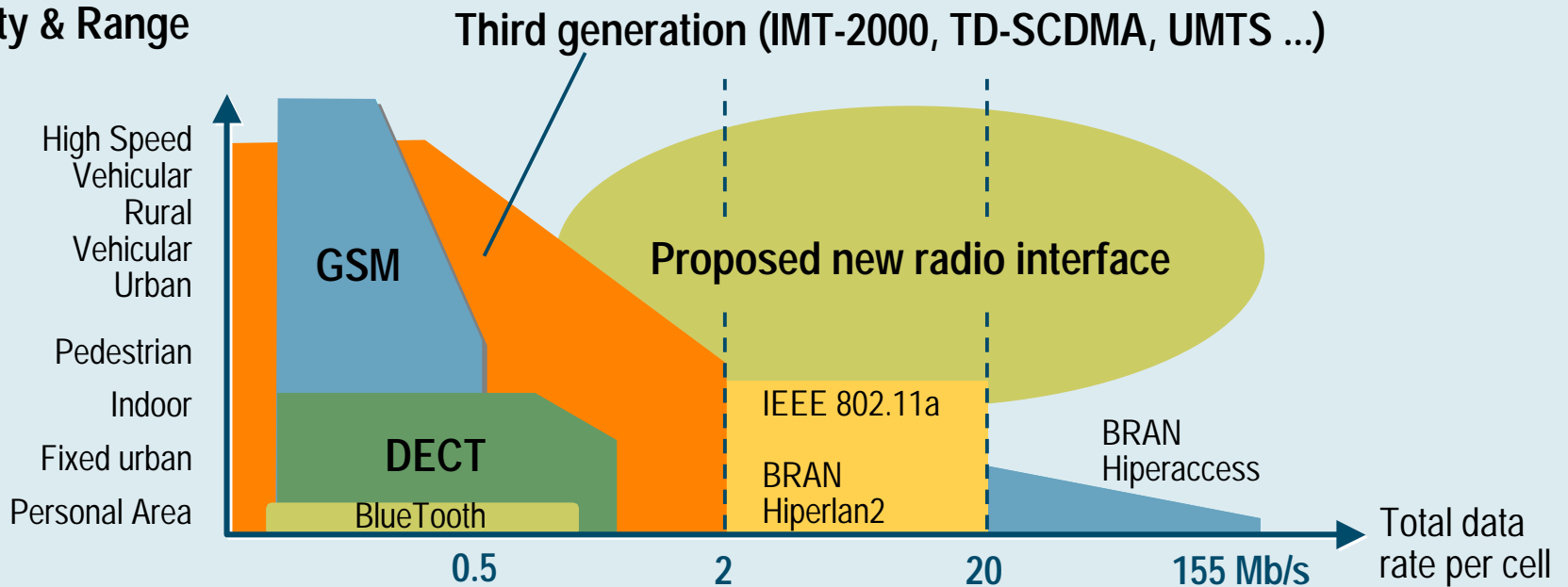Communications**

A Complete Portfolio of
Specialized Radio Solutions is Required

- Mobile radio access networks are designed to meet certain maximum requirements for grade of mobility and range
- WLAN are designed for high data rates, low ranges and generally low mobility

Mobility & Range

Third generation (IMT-2000, TD-SCDMA, UMTS ...)

High Speed
Vehicular
Rural
Vehicular
Urban

Pedestrian

Indoor

Fixed urban

Personal Area

GSM

DECT

BlueTooth

Proposed new radio interface

IEEE 802.11a

BRAN
Hiperlan2

BRAN
Hiperaccess

0.5   2   20   155 Mb/s

Total data rate per cell
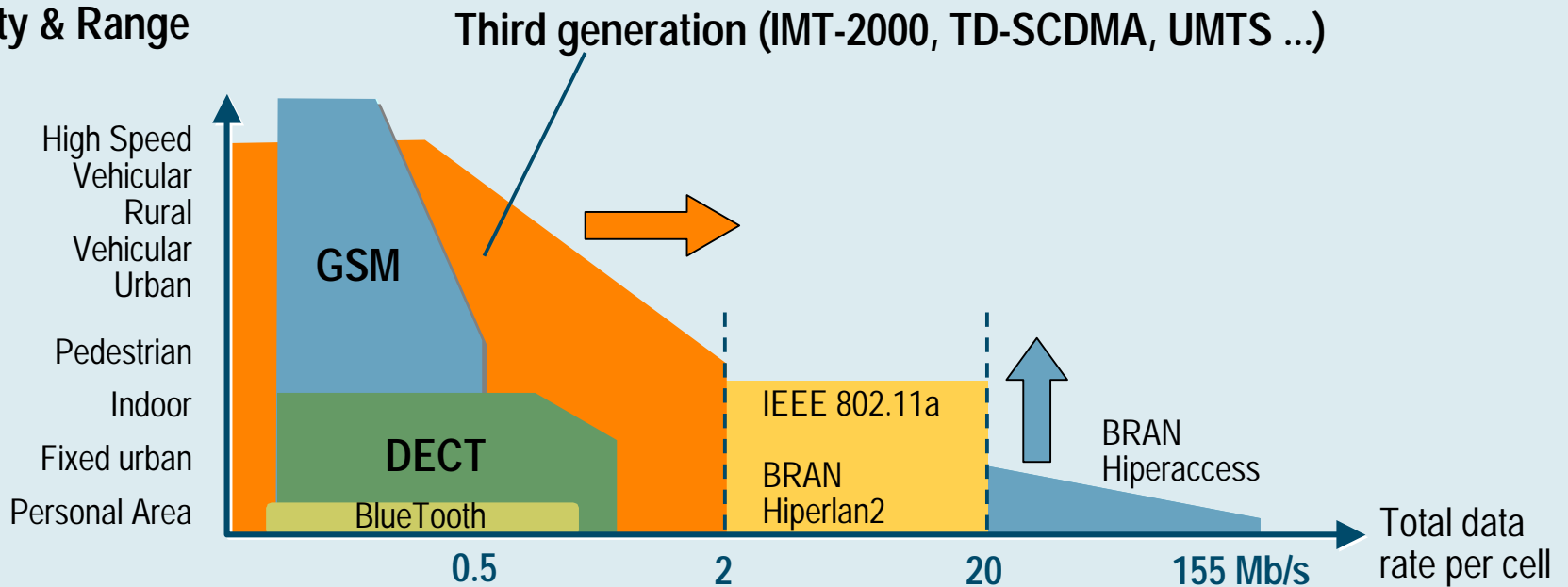
SIEMENS : *Smooth evolution from GSM to UMTS and beyond*

THANK YOU !

Mobile Internet
"Internet-on-Air"

Kiritkumar P. Lathia

Charted Engineer, Fellow I.E.E.

VP - Strategy & Positioning
Siemens ICN S.p.A.
Italy

ITU-T SSG Vice Chairman