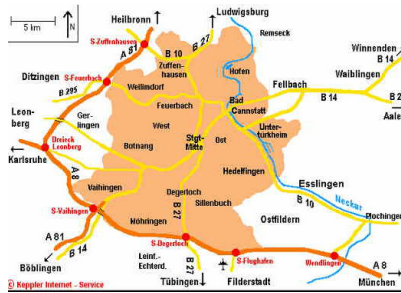




## Network planning at different time scales:

- **Medium term network planning:**



To identify intermediate steps from present to target network

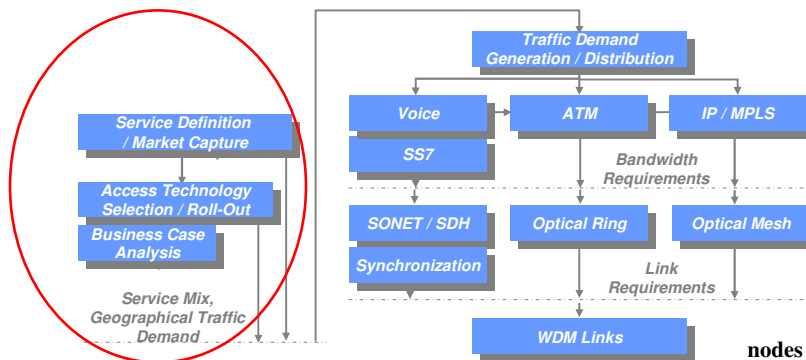
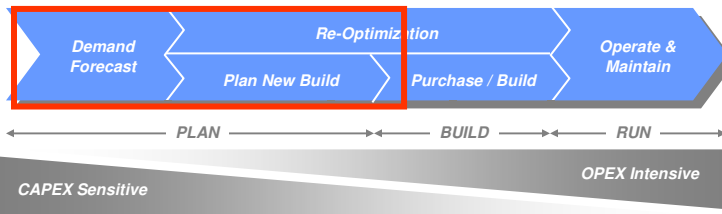


- **Short term network planning :**

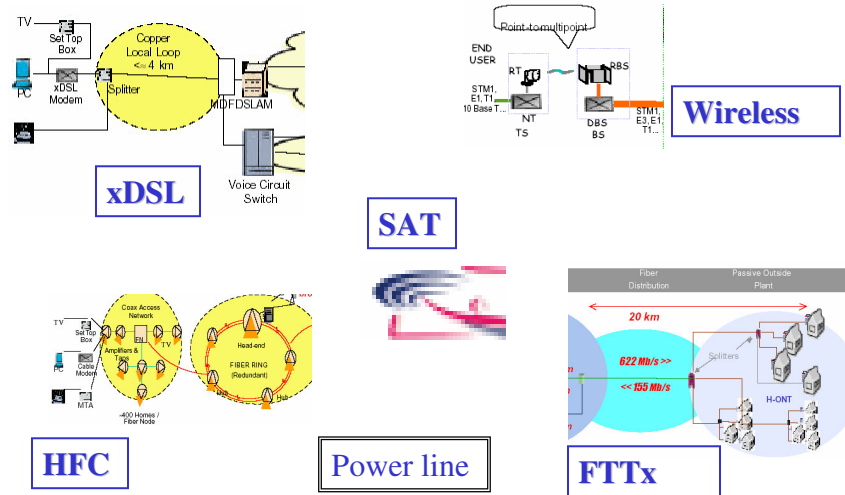
Short-term plans can be made up on regional or local bases

## Planning of telecommunication networks

Network planning



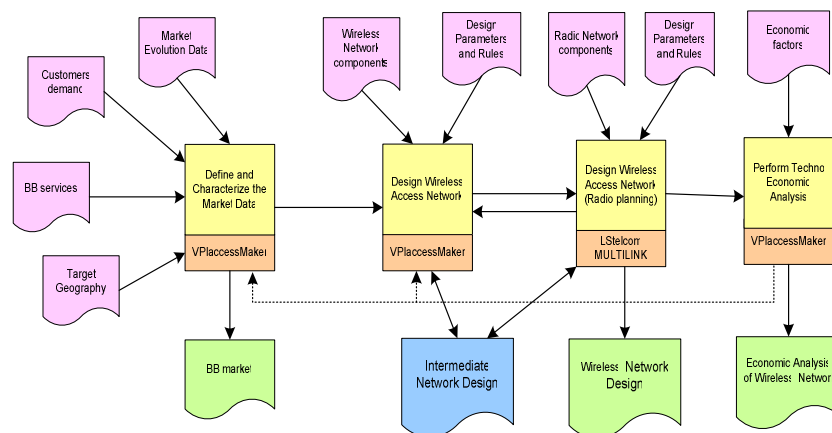
## Access network : broadband access alternatives



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Session 3.2- 5

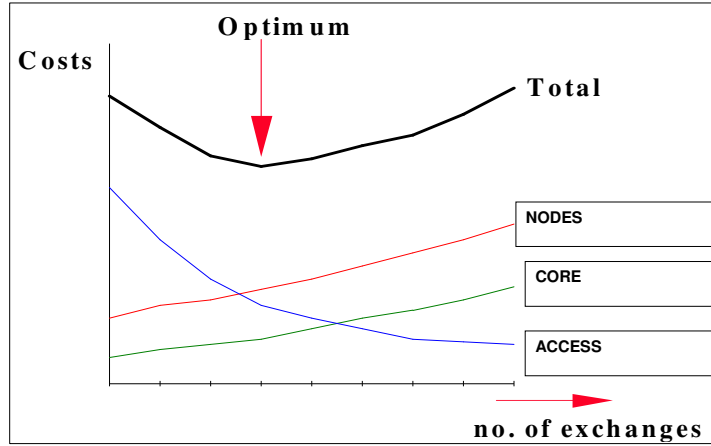
## Planning process for planning of wireless BB access network



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## Planning of telecommunication networks



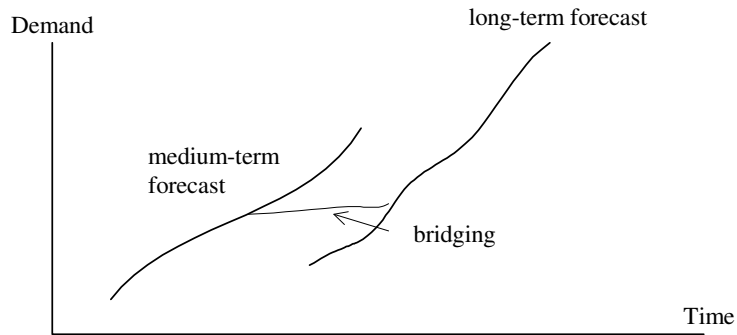
## Optimization of the telecom network

nodes

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## Demand forecasting as bases for network planning



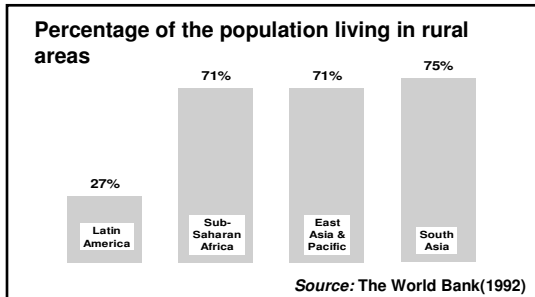
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## Population and usage development trends

### Findings of the United Nations :

- **all growth in population will concentrate in urban areas, no growth in rural areas**
- **most of the growth will concentrate in urban areas of less developed regions**



Users will concentrate in urban areas; as urban areas put higher pressure on the individual to "do what the others do" and from technical point it is easier to connect people in urban areas

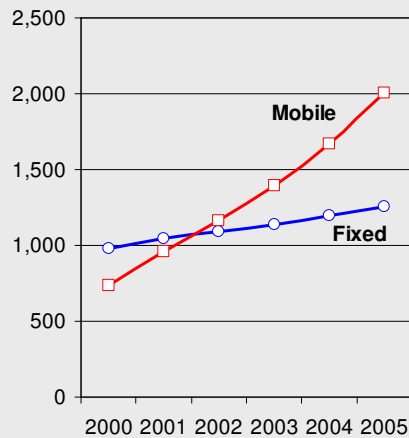
## Millennium Development Goals

	Telephone lines and cellular subscribers per 100 population		Personal computers in use per 100 population		Internet users per 100 population	
	1990	2003	1990	2003	1990	2003
<b>World</b>	10	41	2	<b>10</b>	<1	<b>11</b>
Developed regions	38	125	9	<b>45</b>	<1	<b>45</b>
Developing regions	2	25	<1	<b>3</b>	0	<b>5</b>

Source: World Telecommunication Indicators Database

## Worldwide fixed and mobile subscribers

Worldwide fixed-line and mobile telephone subscribers, millions



Source: TMG, Inc. (2004 estimate and 2005 forecast).



- Mobile passed fixed in 2002 globally; since then the gap has grown
- Today almost every country has more mobile than fixed line subscribers

## Network planning at different time scales as seen in the evolution steps to NGN

- In respect to strategies for introduction of the new equipment
- In respect to strategies for coexisting of the present and future technology

## Strategies for introduction of the new equipment

❖ **Consolidation:**

Optimize the installed PSTN to reduce capital (CAPEX) and operational expenses (OPEX). Consolidation can be combined with a selection of future-safe products to prepare migration to NGN

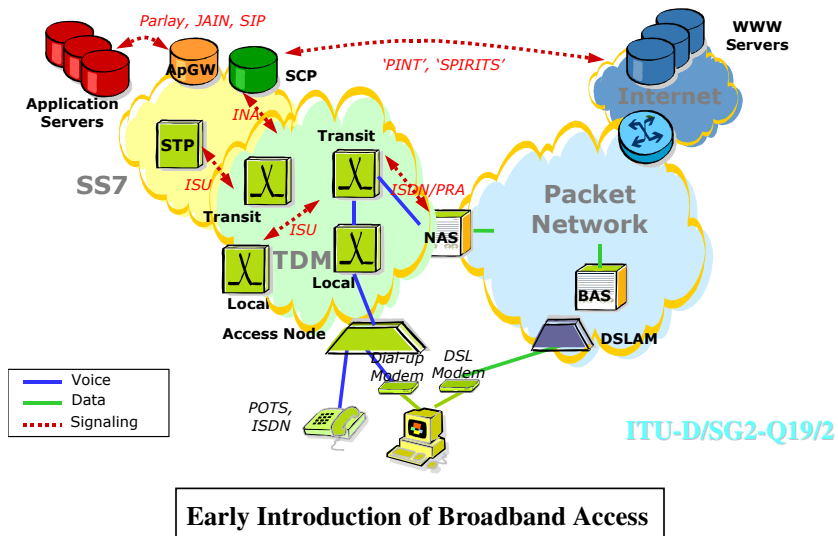
❖ **Expansion:**

Keep the existing PSTN infrastructure and services, but introduce an overlay NGN (based on broadband access) for addressing new customers and introducing new services (e.g., multimedia).

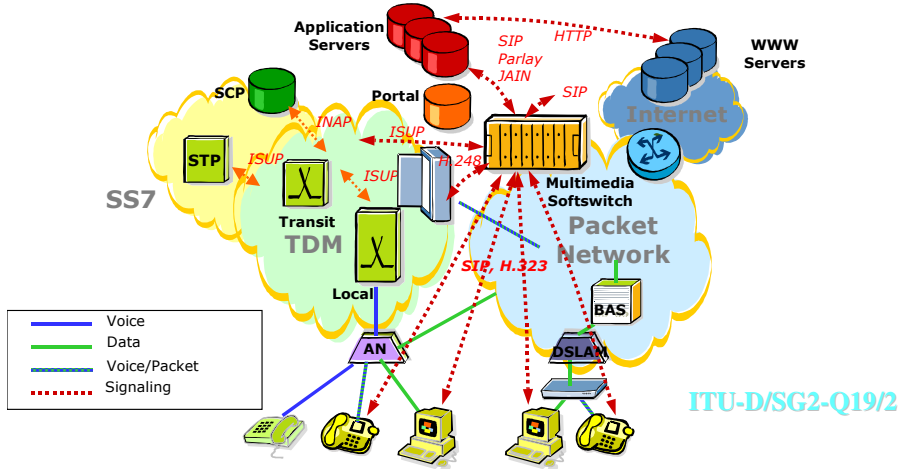
❖ **Replacement:**

Replace PSTN components (at their end-of-life) with equivalent NGN components.

## Evolution steps to NGN

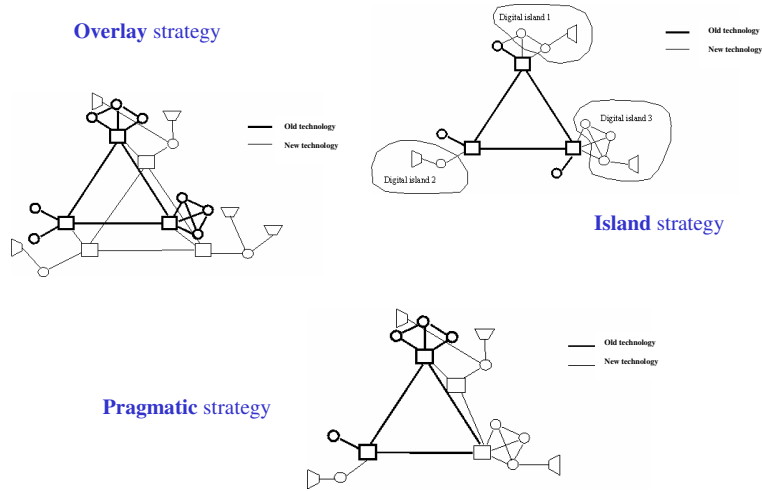


# Next Generation Network NGN



*Multimedia Services and New User/Network Interaction*

# Strategies for coexisting of the present and future technology



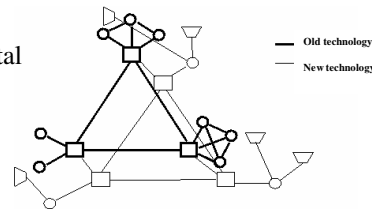
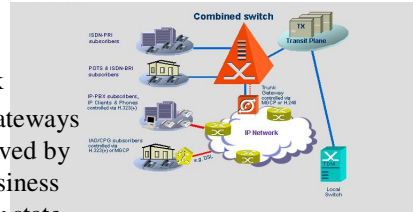


## Strategies for coexisting of the present and future technology

### Overlay strategy

Deployment of overlay NGN access network

- Residential gateways RGW and access gateways AGW are being deployed in the areas served by existing TDM equipment for new and business subscribers to meet their demands on new state-of-the-art services
- Overlay NGN access network with Class 5 softswitches is created.
- Gradually, this network is expanded till the total replacement of the existing TDM equipment

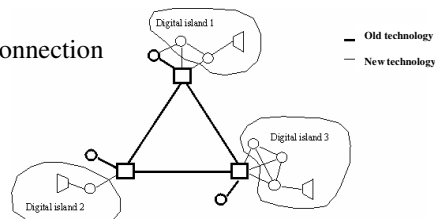


## Strategies for coexisting of the present and future technology

### Island strategy

Deployment of NGN islands in the access network

- PSTN exchanges are replaced with AGW and residential gateways RGW situated at the customer site
- NGN class 5 islands are formed in the TDM network, connected via MAN
- Trunk gateways TGW are used for interconnection with PSTN



## Fixed network users potential

Highly developed countries (close to saturation):

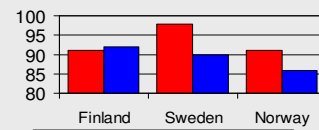
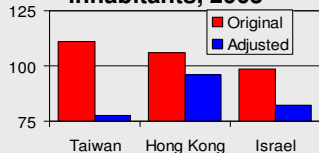
Country	Population (in thousands)	Teledensity [%]	Average household size	Teledensity per household [%]	Percent of residential lines
Australia	19,157	53,86	2,64	101,2	75,0
Canada	30,750	63,45	2,65	98,2	63,9
France	58,892	56,89	2,46	94,0	69,2
Germany	82,260	65,08	2,16	95,5	77,0
Italy	57,298	48,07	2,71	96,9	79,2
Japan	126,919	55,83	2,70	116,8	75,8
New Zealand	3,831	44,81	2,91	103,0	78,5
Republic of Korea	47,300	48,86	3,04	105,5	74,1
Spain	40,600	50,62	3,25	100,8	83,5
Sweden	8,881	68,20	2,22	98,7	67,9
Switzerland	7,204	74,42	2,39	99,6	60,0
United Kingdom	59,766	59,086	2,38	93,0	71,0
United States of America	275,130	64,58	2,58	94,1	67,6

• *teledensity per house-hold about 100%*

• *ratio residential to business from 2 / 1 to 3 / 1*

## Mobile subscribers

**Mobile subscribers per 100 inhabitants, 2003**

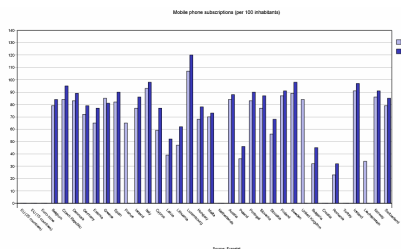


Important to be precise about subscribers in countries already exceeding 100 %

- Taiwan: **20-30%** have 2<sup>nd</sup> SIM card
- Hong Kong: **24%** of prepaid non-active
- Israel: ~ **20%** double counted (due to churn and "liberal" counting policies) or non-resident subscribers

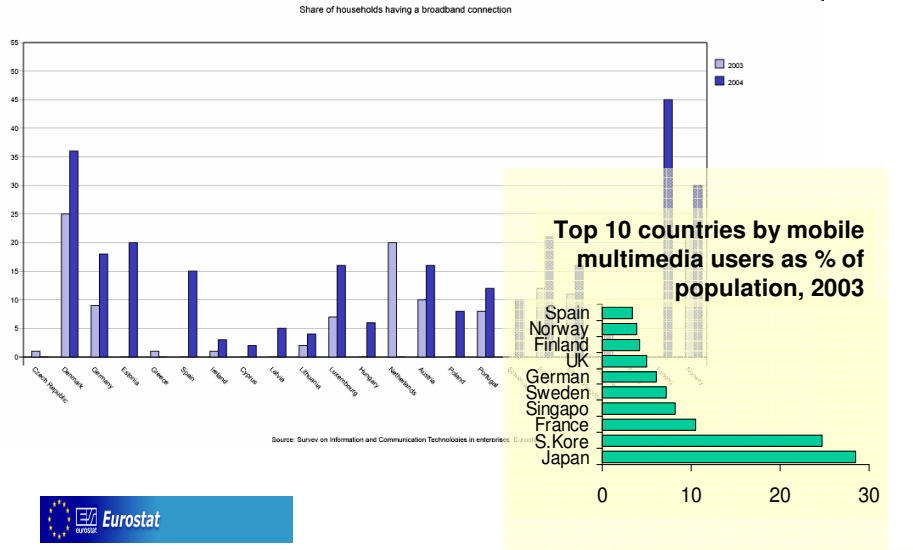
• *teledensity above 90%*

• *related to population brake down*

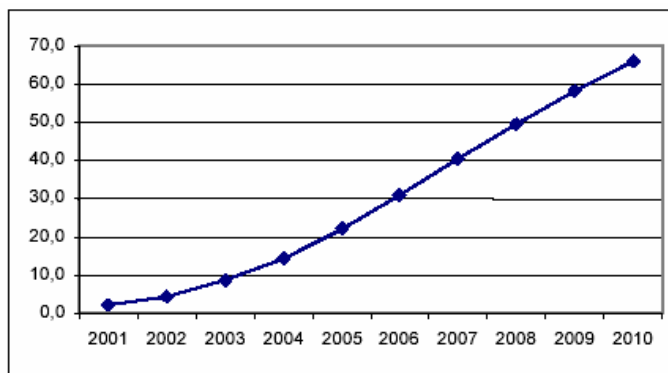




## Broadband connection – statistics



## Broadband connection – evolution



*Broadband penetration forecasts for the residential market - EU*

## **CONCLUSION**

**There is still considerable potential of telecom subscribers in the world, concentrated primarily in the developing countries and after all in the LDCs**

**Planning in the developing countries for a long period will primarily have to solve problems of huge network expansion, so long-term (target) network planning will be essential task**