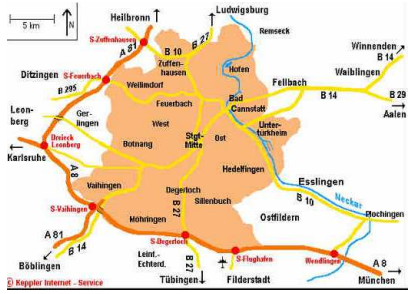


Network planning at different time scales:

- **Medium term network planning:**

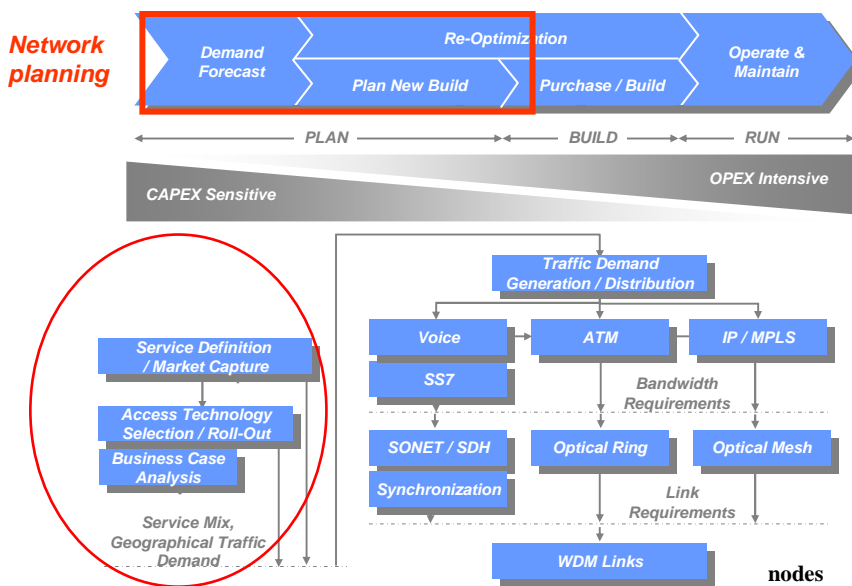


To identify intermediate steps from present to target network

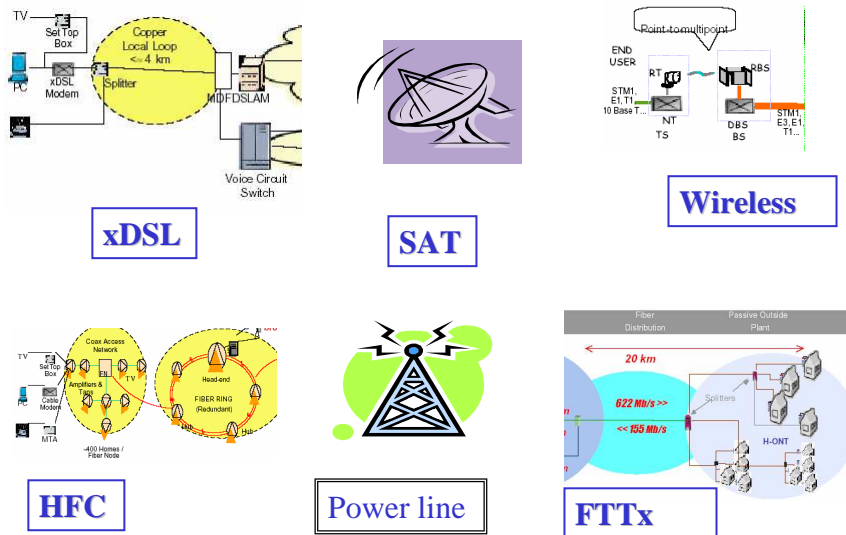


- **Short term network planning :**
Short-term plans can be made up on regional or local bases

Planning of telecommunication networks



Access network : broadband access alternatives

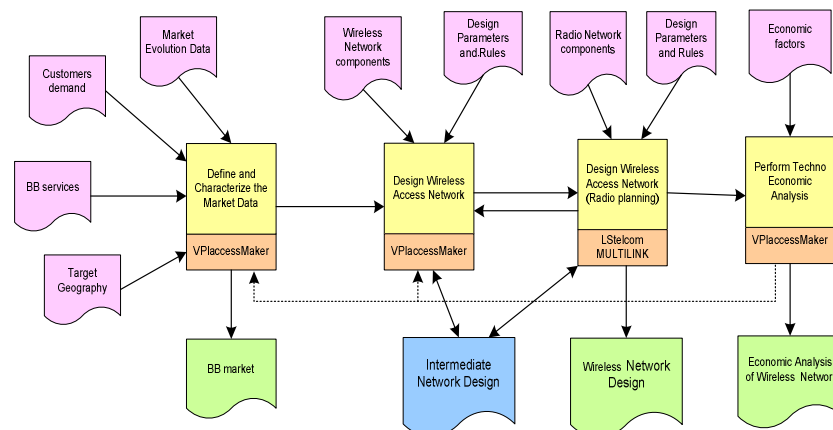


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Planning process for planning of wireless BB access network

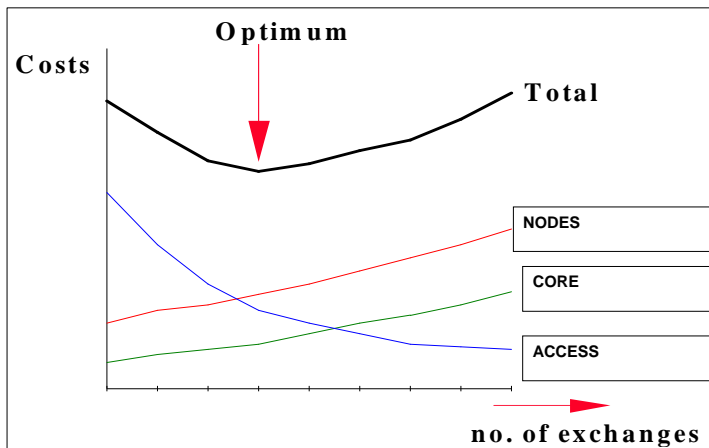


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Planning of telecommunication networks



Optimization of the telecom network

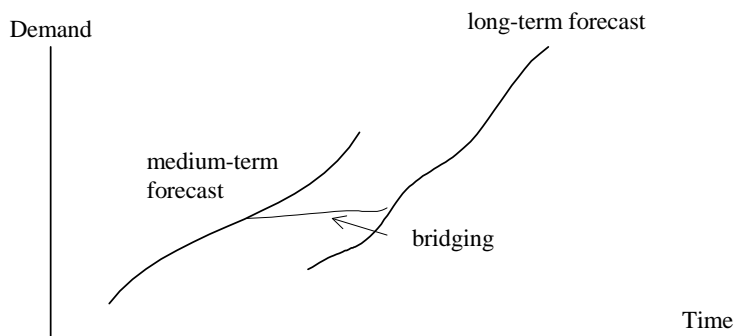
nodes

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Demand forecasting as bases for network planning



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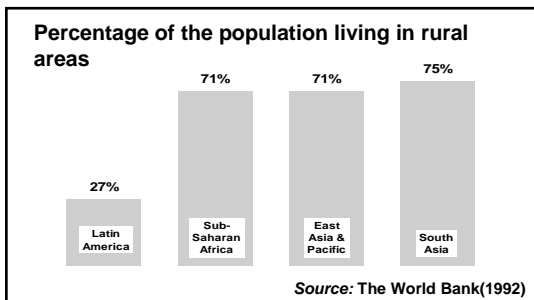
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Population and usage development trends

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

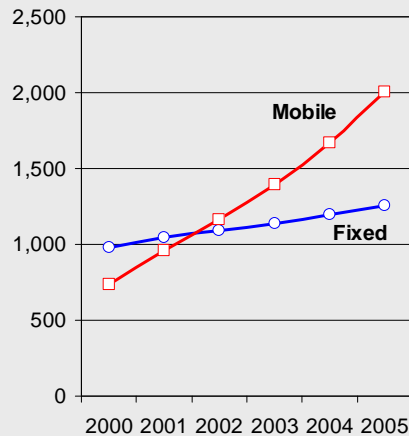
Millennium Development Goals

	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
World	10	41	2	10	<1	11
Developed regions	38	125	9	45	<1	45
Developing regions	2	25	<1	3	0	5

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

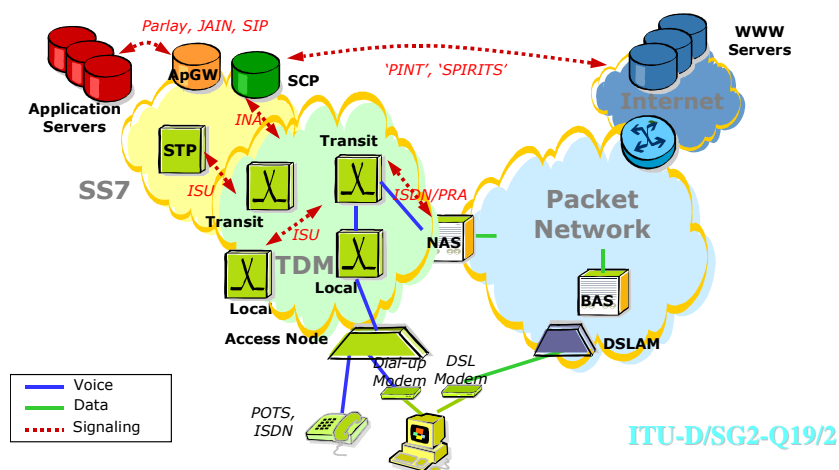
❖ Expansion:

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:

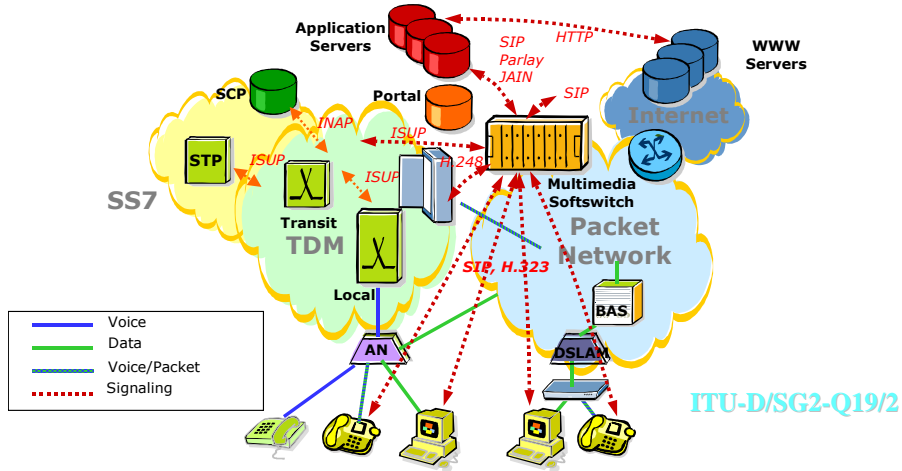
Replace PSTN components (at their end-of-life) with equivalent NGN components.

Evolution steps to NGN



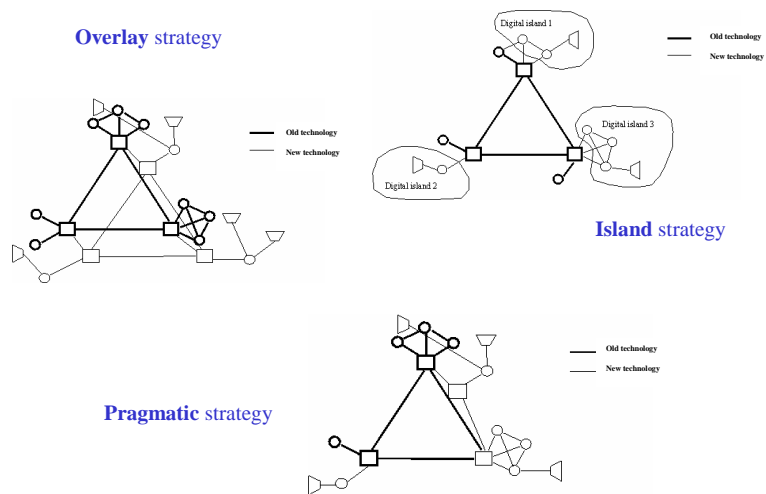
Early Introduction of Broadband Access

Next Generation Network NGN



Multimedia Services and New User/Network Interaction

Strategies for coexisting of the present and future technology

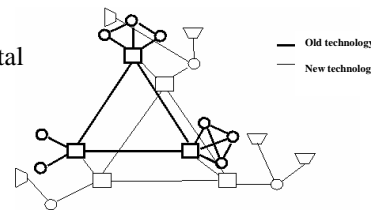
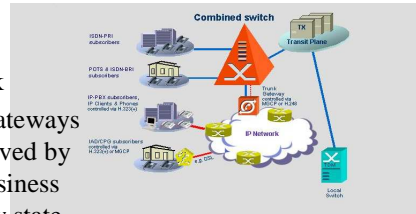


Strategies for coexisting of the present and future technology

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



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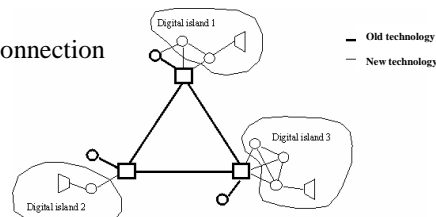
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Strategies for coexisting of the present and future technology

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



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Fixed network users potential

Highly developed countries (close to saturation):

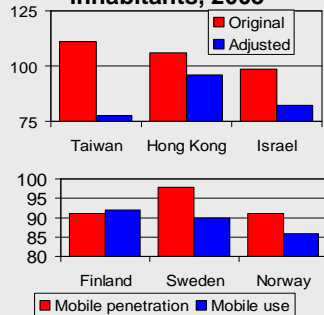
Country	Population (in thousands)	Teledensity [%]	Average household size	Teledensity per household [%]	Percent of residential lines
Australia	19,157	53,86	2,64	101,2	75,0
Canada	30,750	63,45	2,65	98,2	63,9
France	58,892	56,89	2,46	94,0	69,2
Germany	82,260	65,08	2,16	95,5	77,0
Italy	57,298	48,07	2,71	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*

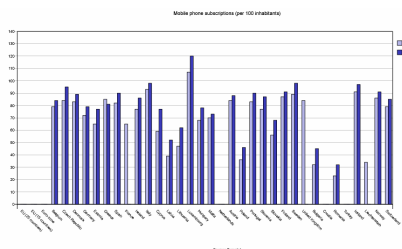
Mobile subscribers

Mobile subscribers per 100 inhabitants, 2003



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

- Taiwan: **20-30%** have 2nd 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*

Cellular mobile network users potential

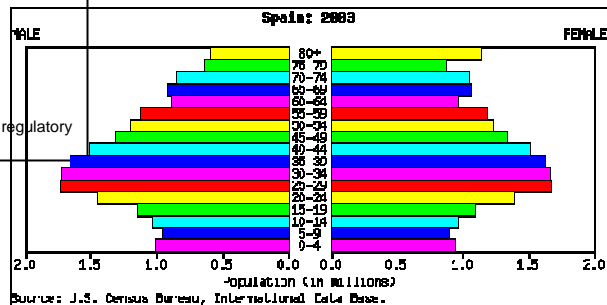
- ❖ Cellular mobile network users potential is related to population brake down by age 6 and above 80

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

Age ranges for mobile use:

- Finland: **15-74**
- Sweden: **16-75**
- Norway: **9-79**

Source: TMG, Inc. adapted from national regulatory & national statistical agencies.



- ❖ **excluding only** unable/unwilling to use telecommunications, e.g. age below 6 and above 80

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Impact of Cellular mobile on Fixed network

Network growth (compound annual growth rate in %)	New telephone lines added 1997-2002	New mobile subscribers added 1997-2002
Low Income	12,5	76,5
Lower Middle Income	14,4	67,6
Upper Middle Income	4,4	57,4
High Income	1,2	29,9
Africa	6,0	74,9
Americas	2,3	28,7
Asia	11,8	43,3
Europe	2,6	46,3
Oceania	0,4	24,3
WORLD	5,3	40,2

World telecommunication/
ICT indicators
ITU Database

Case of Italy (1997-2002):

1,4 % CAGR for fixed network ,
35,2 % CAGR for mobile network

Year 1997: fixed network teledensity 44,79 % , residential lines 76,5 %
cellular mobile teledensity 20,46 %

Year 2003: fixed network teledensity 48,40 % , residential lines 79,2 % (2001)
cellular mobile teledensity 101,76 %

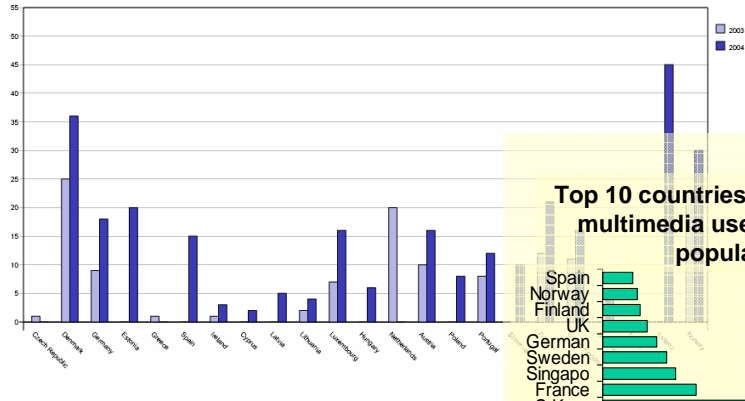
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Broadband connection – statistics

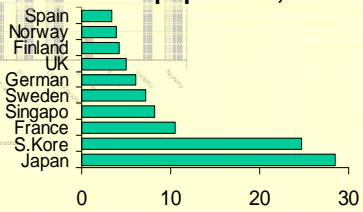
Share of households having a broadband connection



Source: Survey on Information and Communication Technologies in enterprises, Eurostat



Top 10 countries by mobile multimedia users as % of population, 2003



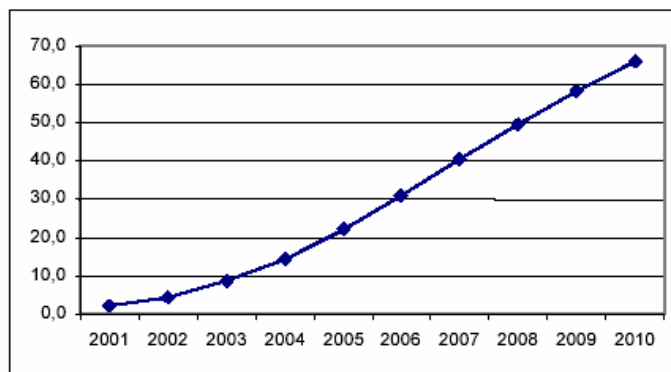
<http://reports.tmgtelecom.com/ssmi>

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Broadband connection – evolution



Broadband penetration forecasts for the residential market - EU

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