

# *Transition from PSTN to NGN: Possible Scenarios*

*ITU-D Regional Development Forum for the EUR and CIS Region  
NGN and Broadband, Opportunities and Challenges  
Chisinau, Moldova, 24 – 26 August 2009*

## **NGN – Next Generation Network**

### ITU-T Recommendation Y.2001:

The NGN (Next Generation Network) is conceived as a concrete implementation of the GII (Global Information Infrastructure)

NGN is a packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

## Incentives of transition to NGN (1)

### *Historical aspects of the telecom market evolution*

Voice services were a “milking cow” for the telecom Operators in XX century. In XXI century situation changes, although voice services remain important source of revenue.

Source: B. Jacobs. Economics of NGN deployment scenarios: discussions of migration strategies for voice carriers. – www.ieee.org.

How much is subscriber eager to pay for broadband access in Russia, per month:

\$10 – 31,2%; \$20 – 43,8%; \$30 – 12,5%; \$40 – 6,2%; \$50 – 6,2%; >\$50 – 0%.

Source: Inform Courier Sviaz, October 2008 (in Russian).

## Incentives of transition to NGN (2)

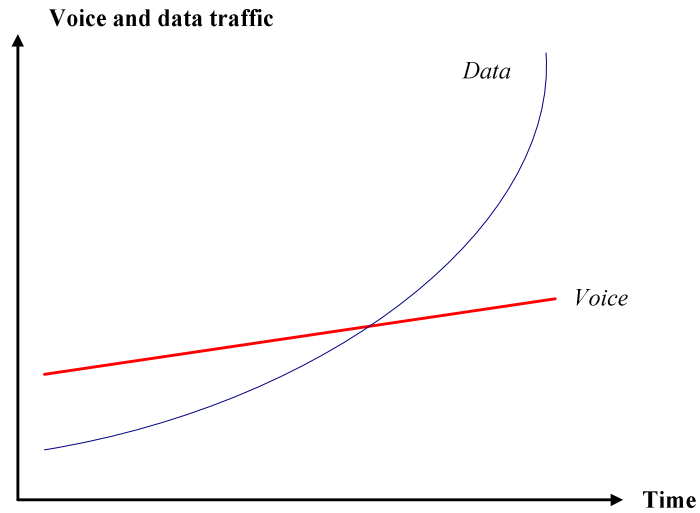
### *Economical aspects of the telecommunication Operator’s service*

Type of Operator’s costs	Today	Change	Tomorrow
Capital investments share	35%	1,25	43,75%
Operational costs share	65%	0,5	32,5%
Total volume of costs	100%	–	76,25%

Source: P.K. Edholm. Networks transformation: correlation of the resources limitation and system complexity. – Mobile telecommunications, 2005, №8.

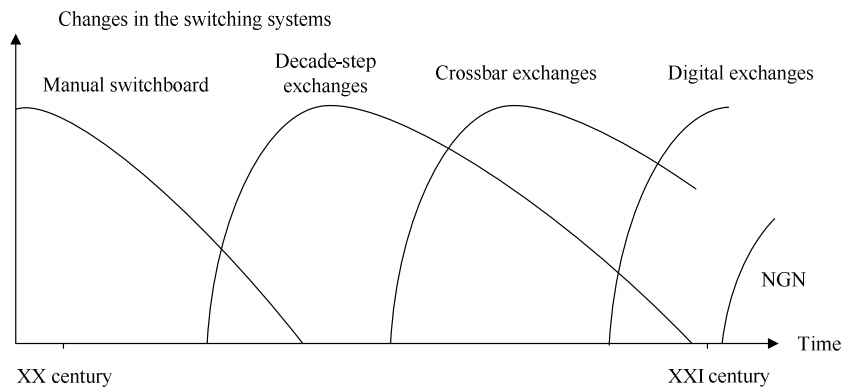
### Incentives of transition to NGN (3)

#### *Aspects of the traffic change*



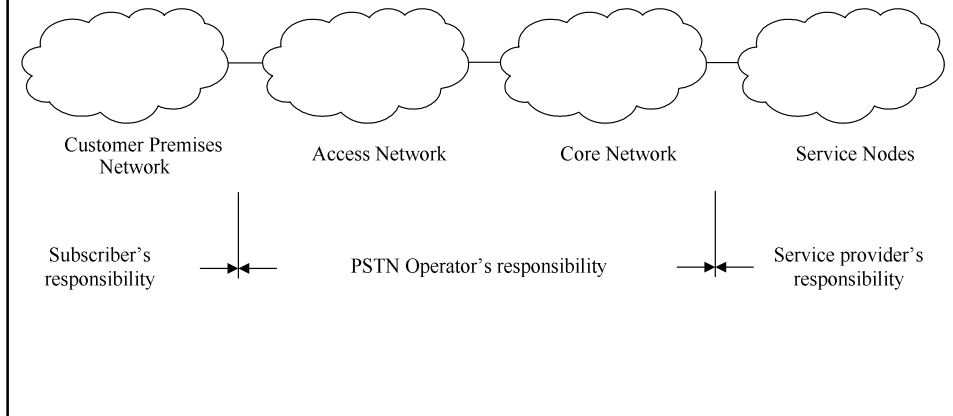
### Incentives of transition to NGN (4)

#### *Aspects of the equipment aging in the telecommunication networks*

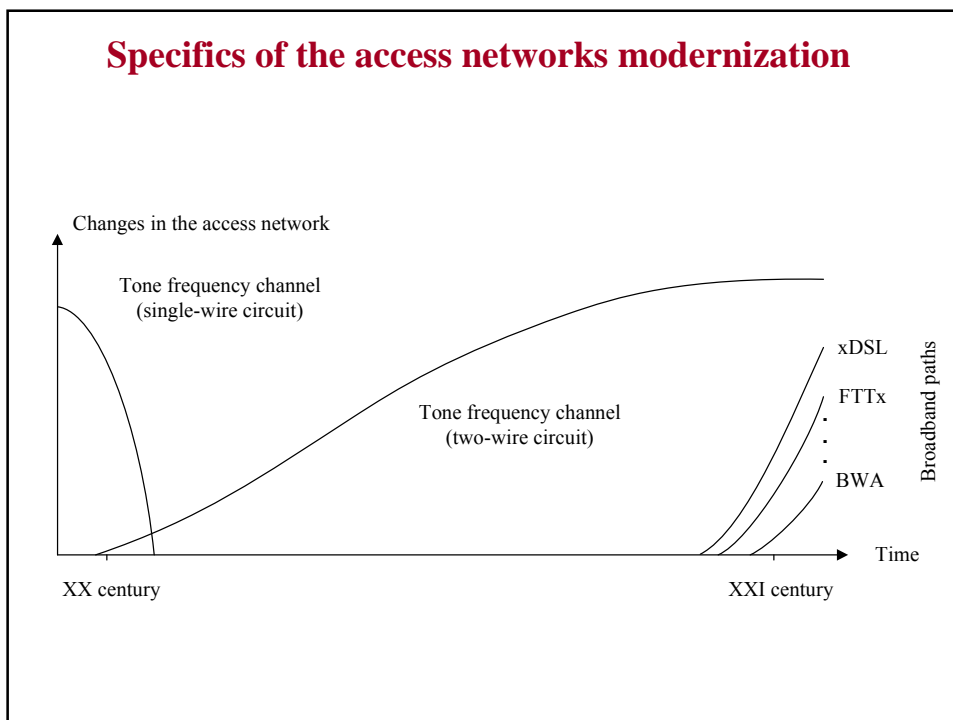


## Incentives of transition to NGN (5)

### *Aspects of integration and convergence*



## Specifics of the access networks modernization



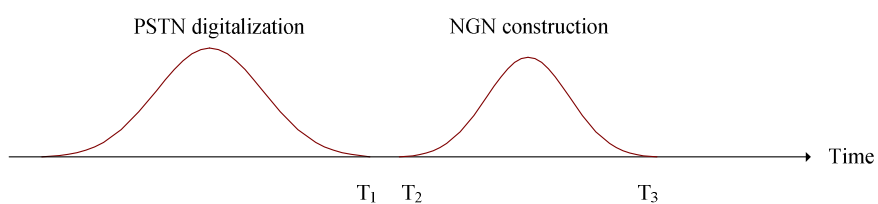
## Statement of the transition to NGN problem (1)

*PSTN Operators should find viable strategy of the transition to NGN, which provides protection of investments in circuit-switched technology.*

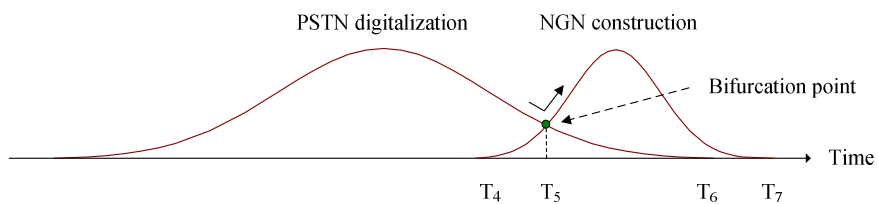
Source: **B. Jacobs. Economics of NGN deployment scenarios: discussions of migration strategies for voice carriers.** – [www.ieee.org](http://www.ieee.org).

**It is necessary to combine PSTN's quality of service and IP technologies' economical efficiency!**

## Statement of the transition to NGN problem (2)



*a) Evolution of the telecommunication system for completely digital PSTN*



*b) Evolution of the telecommunication system for mixed PSTN*

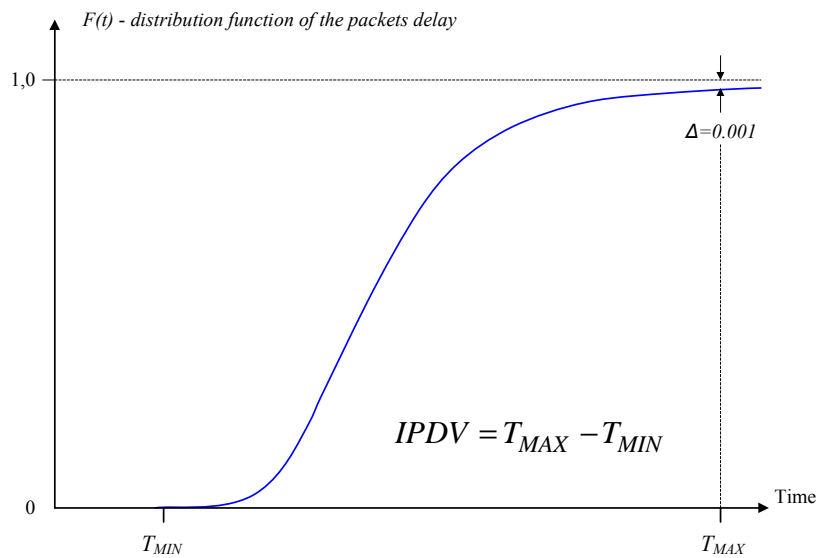
## Quality of service indices for the NGN

In the table below QoS indices for six classes are given. These values are defined for the following indices: IPTD – IP packet transfer delay, IPDV – IP packet delay variation, IPLR – IP packet loss rate, IPER – IP packet error rate.

Source: *ITU-T Recommendation Y.1541*.

QoS class	IPTD	IPDV	IPLR	IPER
0	100 ms	50 ms	$10^{-3}$	$10^{-4}$
1	400 ms	50 ms	$10^{-3}$	
2	100 ms	U	$10^{-3}$	
3	400 ms	U	$10^{-3}$	
4	1 s	U	$10^{-3}$	
5	U	U	U	U

### IPDV definition



## QoS aspect: time irreversibility

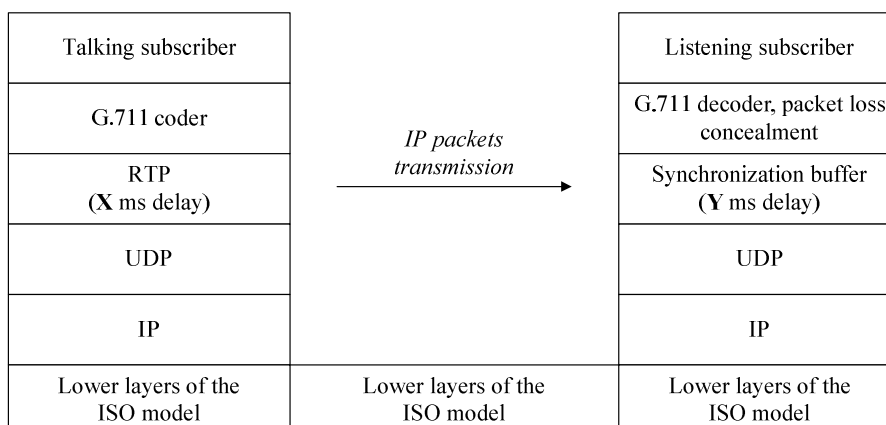
### Speech quality impairment compensation in CS networks:

- Elaboration of the speech signal processing algorithms;
- Signal amplification (when necessary).

### Speech quality impairment compensation in IP networks under condition of the excessive packet exchange delay:

- Impossible in principle!!!

## QoS aspects: ISO model (1)



### QoS aspects: ISO model (2)

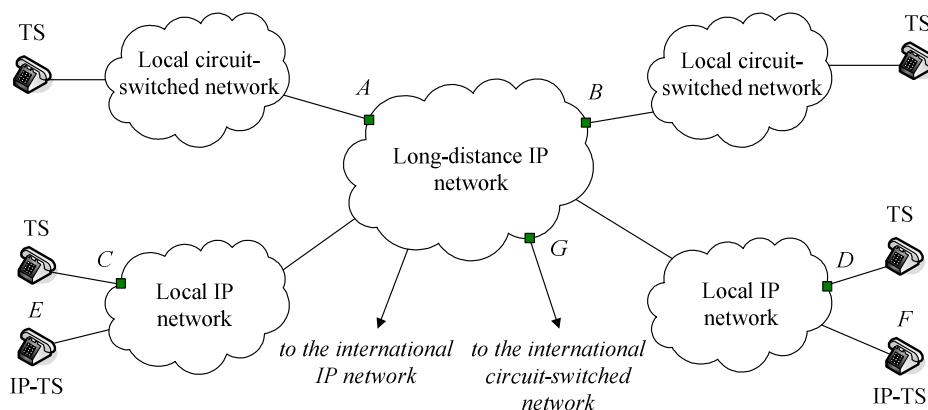
**Z** – normalized quantity of the IP packet mean delay between UNIs,

**T** – propagation time between UNIs,

**N** – acceptable number of NGN domains between two terminals:

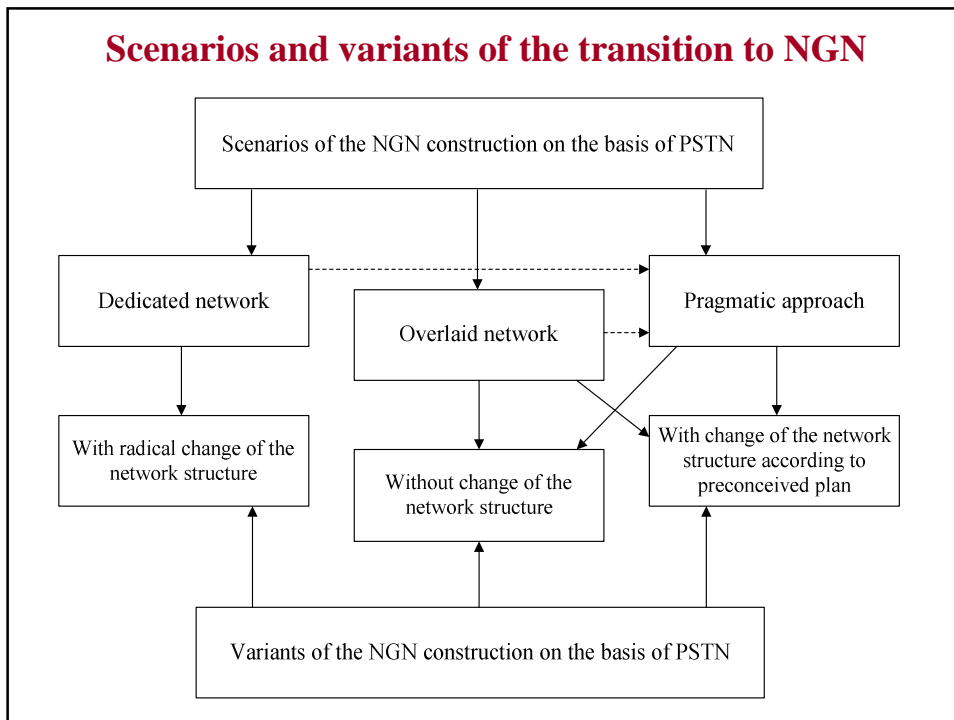
$$N \leq \left[ \frac{Z - T}{X + Y} \right]$$

### Modernization principles of the PSTN as a whole

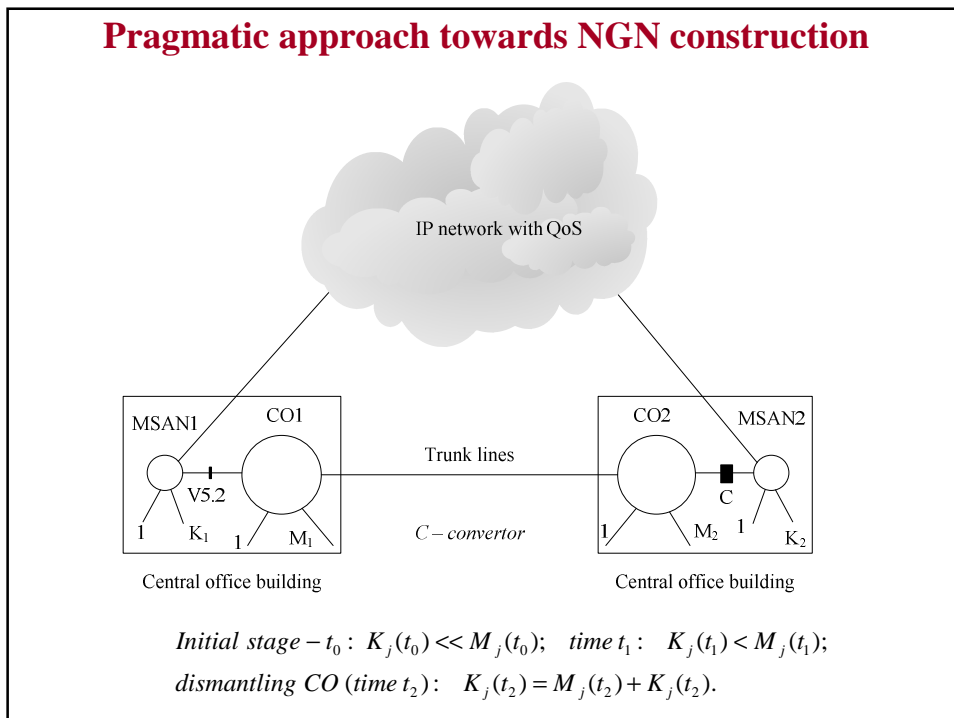




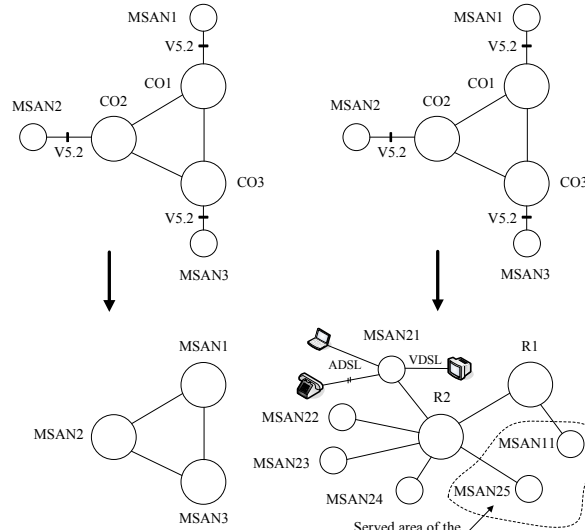
## Scenarios and variants of the transition to NGN



## Pragmatic approach towards NGN construction



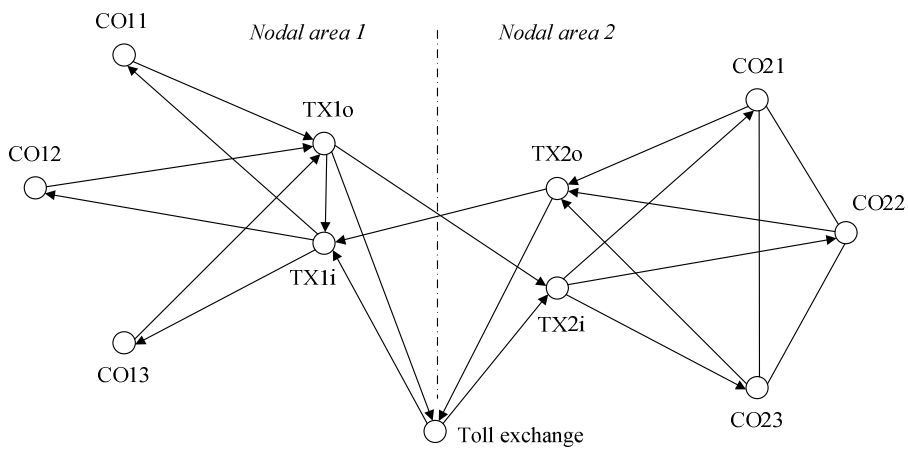
## Two variants of the transition to NGN



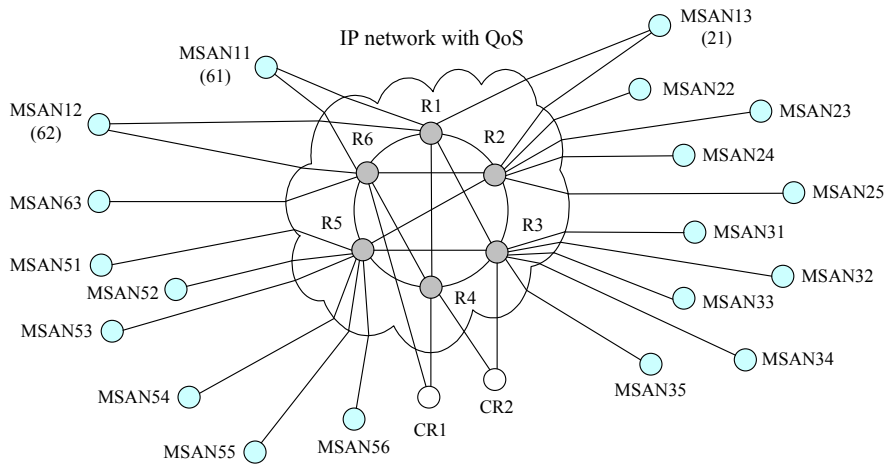
*a) Variant of the NGN construction without change of the existing network*

*b) Variant of the NGN construction with changes according to preconceived plan*

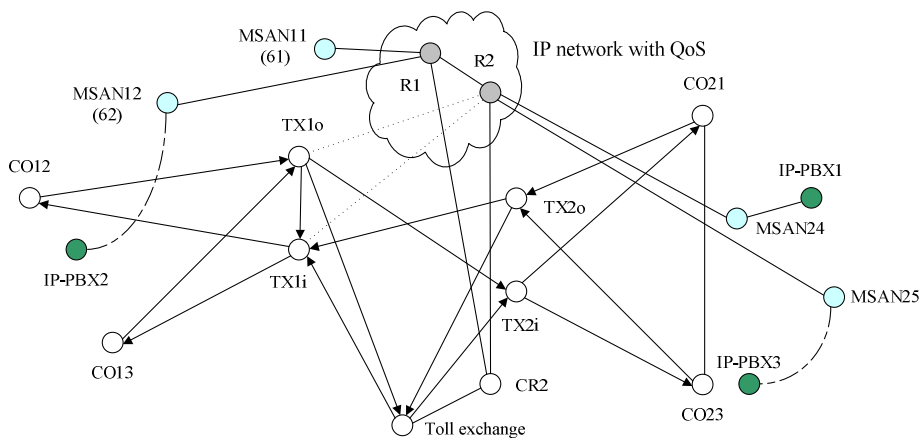
## Modernization of the urban network with transit exchanges (1)



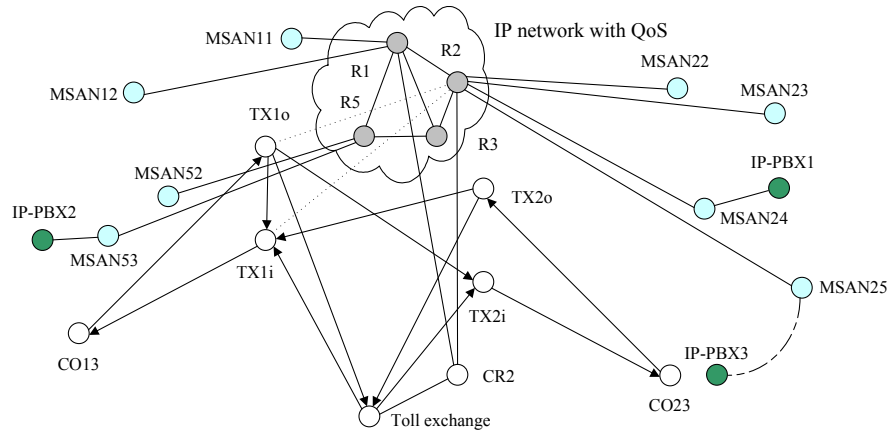
## Modernization of the urban network with transit exchanges (2)



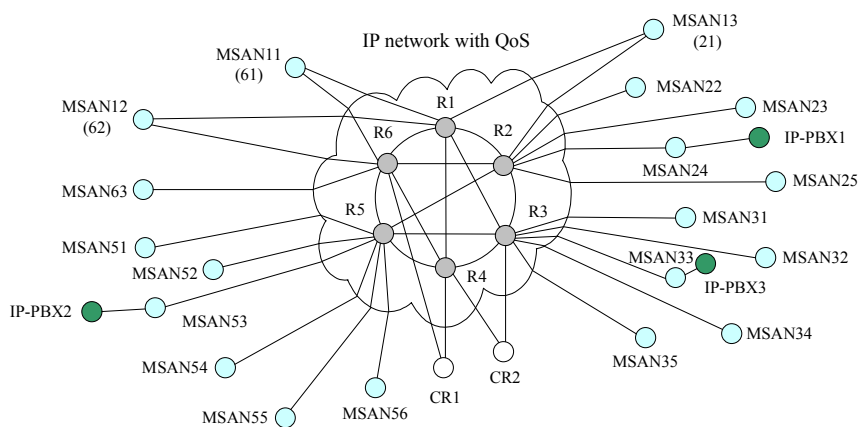
## Modernization of the urban network with transit exchanges (3)



### Modernization of the urban network with transit exchanges (4)



### Modernization of the urban network with transit exchanges (5)

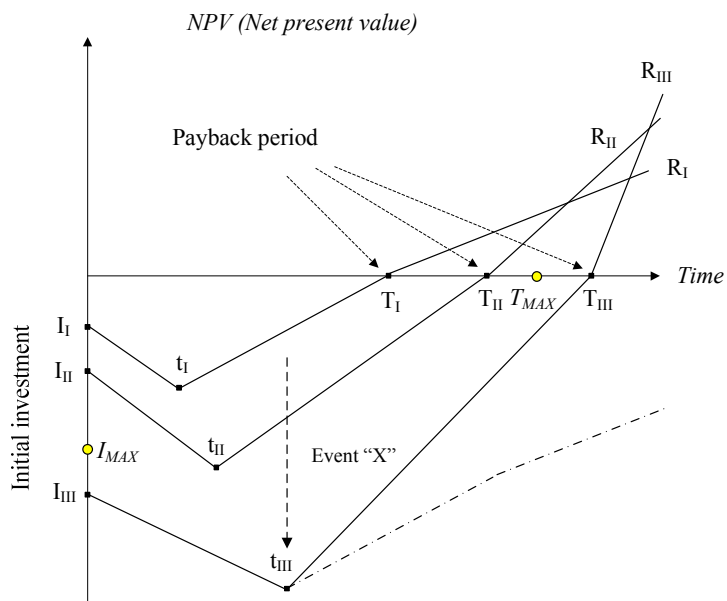


### Risk estimation for PSTN Operator

Development of the PSTN without transition to NGN		Construction of the NGN as overlaid network		Pragmatic approach towards NGN construction	
Mean value	Variation coefficient	Mean value	Variation coefficient	Mean value	Variation coefficient
0.81	0.25	0.40	0.59	0.35	0.69

*Poll results acquired by means of Delphi method*

### Economics and risks: typical NPV curves



*Transition from PSTN to NGN:  
Possible Scenarios*

**Thank you!**

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