Telkom Workshop with the Portfolio Committee on Communications in Parliament

06 – 07 October 2004

Terms of Reference

The Portfolio Committee on Communications has requested Telkom to present on the technical and regulatory aspects of its business

Introducing the Telkom Delegation

• Nkenke Kekana	Group Executive – Regulatory & Public Policy
• Benitto Lekalakala	Executive – Parliament, Policy & Legislation
• Wally Broeders	Executive – Integrated Network Planning
• Jack Tlokana	Senior Specialist – RC: Advanced Technology
• Graham Keet	Senior Specialist – RC: Special Markets
• Josephine Mabotja	Senior Specialist – Competition Law & Economics
• Izaak Coetzee	Senior Specialist - Regulatory Economics
• Nozicelo Ngcobo	Senior Specialist – Research and Strategy
• Keso Mbali	Senior Specialist - Multi-media and Convergence
• Maphelo Mvunelwa	Specialist – Parliamentary Liaison

Agenda items

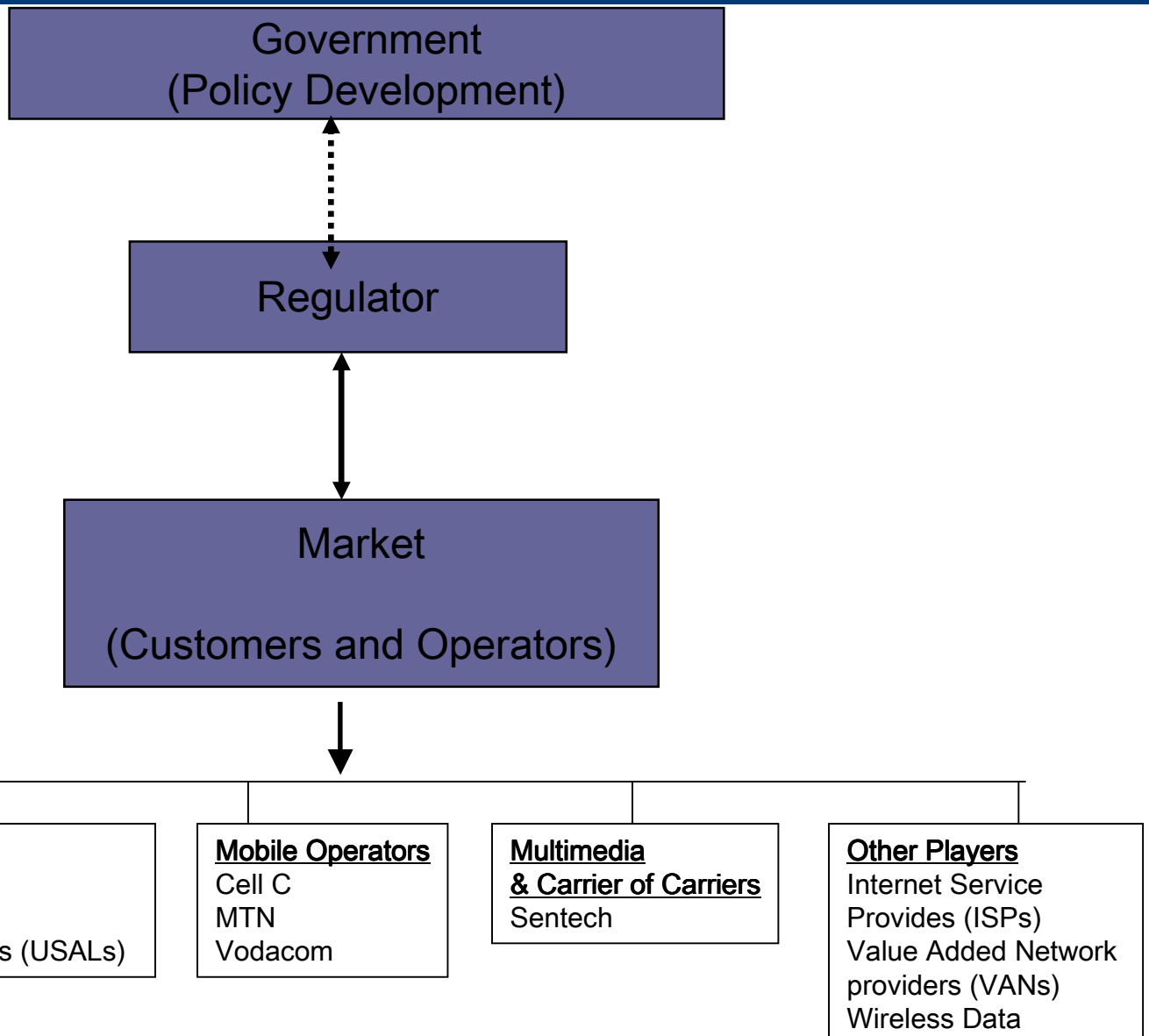
- Overview of the Current Regulatory Environment
- Overview of the Expected Regulatory Environment
- Telkom Licences
- Numbering Plans
- COA/CAM
- Interconnection
- Carrier Pre-Selection
- Number Portability
- Network Planning and Management
- Square Kilometre Array (SKA)
- Convergence

Overview of the Current Regulatory Environment in South Africa

International Telecommunications Reform

- Early 1990's - end of telecommunications natural monopoly across the world as administered by governments
- Economic and technological developments necessitated a review of the treatment of telecommunications
- WTO, ITU, EU and other international bodies reassessed the increasing importance of telecoms and its expanded role in the market
- The above resulted in telecoms reform and the design of the so-called optimal institutional structure

The decentralised structure of telecom reform

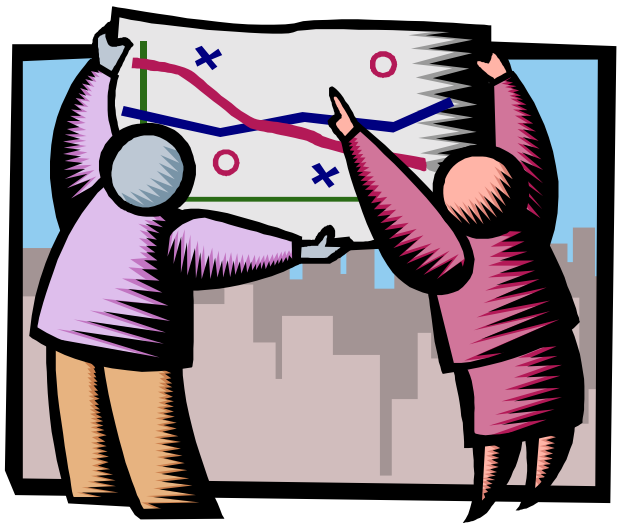


Policy Reform Process – South Africa Response

The policy reform process in the telecom industry is being conducted in three phases:

Phase 1:	1996 - 2002/3	Sectoral Reform
Phase 2:	2002/3 – 2007	Managed Liberalisation
Phase 3:	2007 – beyond	Full Liberalisation

SA Telecoms Market - Historical and Expected Developments



2007 - Full Liberalisation

2005 – Convergence Legislation expected

2004 – SNO Licence Granted

2003 – Telkom Listing

2002- End of Telkom's Exclusivity

2001 – Telecommunications Amendment Act

2001 - 3rd Cellular Licence

1997 - Telkom Licence

1996 - Telecommunications Act

1993 - Cellular Licences

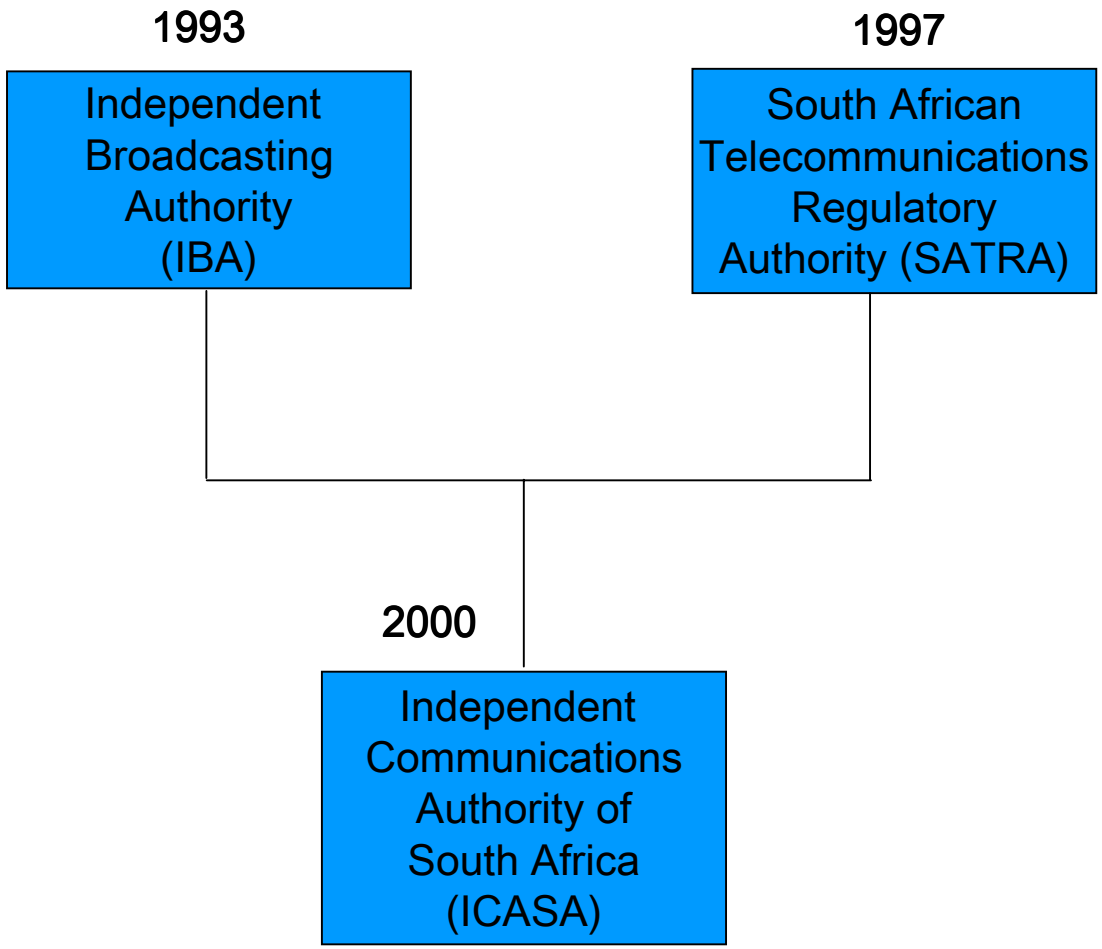
1991 - Creation of Telkom Ltd

Managed Liberalisation

- SA opted for managed liberalisation of the telecoms sector has gradually opened to competition while ensuring optimum utilisation of existing investment in the sector

- A big bang approach would have opened up the sector quickly and offer many services from different network operators, but this approach could potentially have eroded SA's public and private investment

History of the Regulator in SA



Role of the Regulator – ICASA

- ICASA regulates the telecommunications and broadcasting industries in the public interest. Its key functions are to:

  - ✓ make regulations and policies that govern broadcasting and telecommunications
  - ✓ issue licenses to providers of telecommunication services and broadcasters
  - ✓ monitor the environment and enforce compliance with rules, regulations and policies
  - ✓ hear and decide on disputes and complaints brought by industry or members of the public against licensees
  - ✓ plan, control and manage the frequency spectrum and numbering resources
  - ✓ protect consumers from unfair business practices, poor quality services and harmful or inferior products

The Independence of the Regulator

Conditions necessary for an Independent Regulator

- Guiding principles on the Regulator mandates
- Decision making process should be transparent and independent
- Funding
- Adequate resources and capacity

Experiences in South Africa

- ICASA been challenged by operators on flawed administrative procedures
- Act provides for decisions made by ICASA to be approved by the Minister
- ICASA is funded by the Government and not through license fees
- ICASA plagued by limited resources e.g. HR on key ICT competencies

Regulatory Challenges facing the Sector

- Funding of the Regulator
- Convergence
- Globalisation
  - Regional Regulator?
  - Continental Regulator?
- Adequacy of ICT Skills

Overview of the Expected Regulatory Environment

Ministerial Determinations
3 September 2004
Notice 1924 of 2004, Gov Gazette 26763

Implementation date: 1 February 2005

Policy Announcements by the Minister

Current Situation	Situation as from 1 Feb 2005
Self provision and greater choice for mobile operators Mobile operators are not allowed to provide their own fixed lines or acquire them from any provider other than Telkom and/or a public switched telecommunications service provider	Mobile operators are may utilise any fixed lines that may be required for the provision of the service including fixed lines made available by Telkom or any other person providing a PSTS
Provision of Public Pay Phones Public payphones are services whereby providers, be they individuals or entities, purchase pay phones from manufacturers, lease lines or purchase airtime to resell to the public on their own.	Persons may apply for a licence to provide public pay phone services in any area of the Republic. The Department is considering the removal of licensing requirements to provide these services
Provision of voice by VANS Current legislation allows only PSTS licensees to transmit voice. Provision of voice by VANs is prohibited	Value added networks may carry voice using any protocol
Choice in the provision of Value Added Network Services Value added networks can only be provided through Telkom	VANs may also be provided by means of telecoms facilities other than those provided by Telkom and the SNO or any of them
Cession of telecommunications services by VANs VANs are restricted from trading their telecommunications facilities in any way	A person who provides a value added network service shall be entitled to cede or assign the right to use, or to sublet or part with control or otherwise dispose of the telecommunications facilities used for the provision of the value added network service
Optimising the use of Private Telecoms Network Facilities There are many entities in South Africa that have private telecommunications facilities. Such facilities cannot be sublet or re-sold and are therefore under-utilised.	Private telecommunications network operators shall be entitled to resell spare capacity and facilities or to cede or assign his or her rights to use such facilities or to sublet or otherwise part with control thereof

Mobile Cellular Operators (MCOs)

- Self-provision and greater choice for MCOs
- Obtain fixed links from Telkom or SNO
- Self provide fixed links

Provision of Public Pay phones

- Telkom, SNO, USALs & MCOs
- Any person licenced

Value Added Network Service Providers (VANS)

- Provision of voice: VANS may carry voice using any protocol
- Choice in provision of VANS: May use facilities other than those provided by PSTS
- Cession of Telecoms Services by VANS: Entitled to cede, assign rights to use, sublet or depart telecoms facilities

Private Telecommunication Networks (PTN)

- Optimising use of PTN facilities
- May not self-provide, obtain facilities from PSTS providers
- Entitled to resell spare capacity and facilities, or cede, assign rights to use, sublet or depart facilities

Preparing youth for Knowledge Economy

- Public schools & public further education institutions entitled to 50% discount on telecoms calls to ISPs & access fees to internet
- Implementation - 18 January 2005
- Telkom working with DoC and Dept of Education on implementation

Impact on ICT Sector

- Further policy announcements in October 2004
- Viability of SNO and USALs
- Consultation process
- Interpretation of carrying of voice by VANs: may result in 300 potential public switched telephone service providers
- Convergence legislation
- Third National Operator and/or other serviced based licencees
- Unclear how 2nd economy will benefit

Service Obligations

- Rights come with obligations
- Access to emergency / lifeline / SOLAS services
- Compliance to national security objectives as prescribed by the Interception of Communications and Provision of Communication-Related Information Act
- Compliance to environmental legislation
- Licence fees and contribution to Universal Service Fund and Skills Levy
- Universal Service objectives
- Regulated tariff regime

Service Obligations Cont.

- Service continuity and quality
- Consumer protection
- Carrier Preselection
- Number Portability
- Directory Services Database
- Continued investment in infrastructure

Risks for Telkom

- 2 Billion Rand market capitalisation destroyed
- Over regulation of Telkom
- Revenue loss and knock-on effect
  - Increased cost reduction and efficiency improvements pressures
  - Reduced sponsorship and social responsibility activity
- Cannot sustain cross subsidization
- Adverse impact on job creation
- Higher labour costs
- Unintended consequences downstream
  - Lower BEE Spend
  - Fewer SMME opportunities
  - Erosion of jobs

Macro-economic impact on South Africa

- Change in Government Policy to accelerated process of liberalisation
- Big bang approach shakes investor confidence
- Creates conducive environment for foreign operators and illegal operators
- Cherry-picking weakens poverty alleviation initiatives
- Marginalised universal access
- Compromised service continuity and quality
- Hampered investment in infrastructure
- Retarded NEPAD ICT Initiatives

Clear Regulatory Framework

- Competition rules must be clear and transparent
- Minimise regulatory uncertainty and litigation
- Empower the Regulator
- Re-define mandate of the Universal Service Agency and Universal Service Fund
- ICASA to develop regulatory framework
- Stability of telecoms industry

Next Steps

- The Minister will make further policy announcements in October 2004:
  - Service-based licences to be operational by May 2005
  - The remaining Under-serviced Area Licences
  - The Second National Operator
  - The Convergence Bill
  - The ICT BEE Charter

Question and Answer Session

Telkom Licences

TELKOM'S PSTS LICENCE

- Licensed rights (Condition 2)
  - construct, maintain and use the public switched telecommunication network (PSTN)
  - connect any national or international telecommunication system to the PSTN
  - convey any signal to and from those systems
  - install, maintain, lease or sell customer premises equipment (CPE)

TELKOM'S PSTS LICENCE

- Exclusivity for 5 years (Condition 3)
  - National Long-distance
  - International
  - Local access
  - Public Pay-telephones
  - Facilities leased to:
    - Value added network services (VANS)
    - Private telecommunication networks (PTNs)
    - Cellular networks

TELKOM'S PSTS LICENCE

- Universal Service (Condition 4)
  - Provide to anybody who requests it (subject to credit referencing):
    - A basic telephone service
    - A basic telephone instrument
  - Public Pay-telephones
  - Free access to emergency services

TELKOM'S PSTS LICENCE

- Directory Services (Condition 5)
  - Printed directories
  - Directory enquiries
  - Listing of Governmental authorities

TELKOM'S PSTS LICENCE

- Consumer protection (Condition 6)
  - Price cap (Condition 7)
  - Publication of charges
  - Customer confidentiality
  - Itemised billing
  - Customer assistance procedures
  - Code of practice

TELKOM'S PSTS LICENCE

- Fair trading (Condition 9)
  - no undue preference or discrimination
  - no unfair favouring of own business
  - no exclusivity of supply
  - no linked sales
  - no unfair cross-subsidisation

TELKOM'S PSTS LICENCE

- General conditions:
  - Licence fees: 0.1% of annual revenues from PSTS
  - Release from obligations to provide service (Condition 13.4.3)
    - *Force majeure*
    - Breach of contract
    - Default of liability
    - Illegal usage

TELKOM'S OTHER LICENCES

- Radio spectrum and station licence
  - Licence to possess, establish, maintain and use radio stations
  - Annual spectrum fees amount to about R30 million
- Value Added Network Services licence
  - Includes services such as Internet service provision, electronic mail, electronic data interchange, database access, network management

THE PSTN – Act Section 36B

Local Access Network

National Long Distance Network

International Network

PSTN includes:

- optic fibres

-copper cables

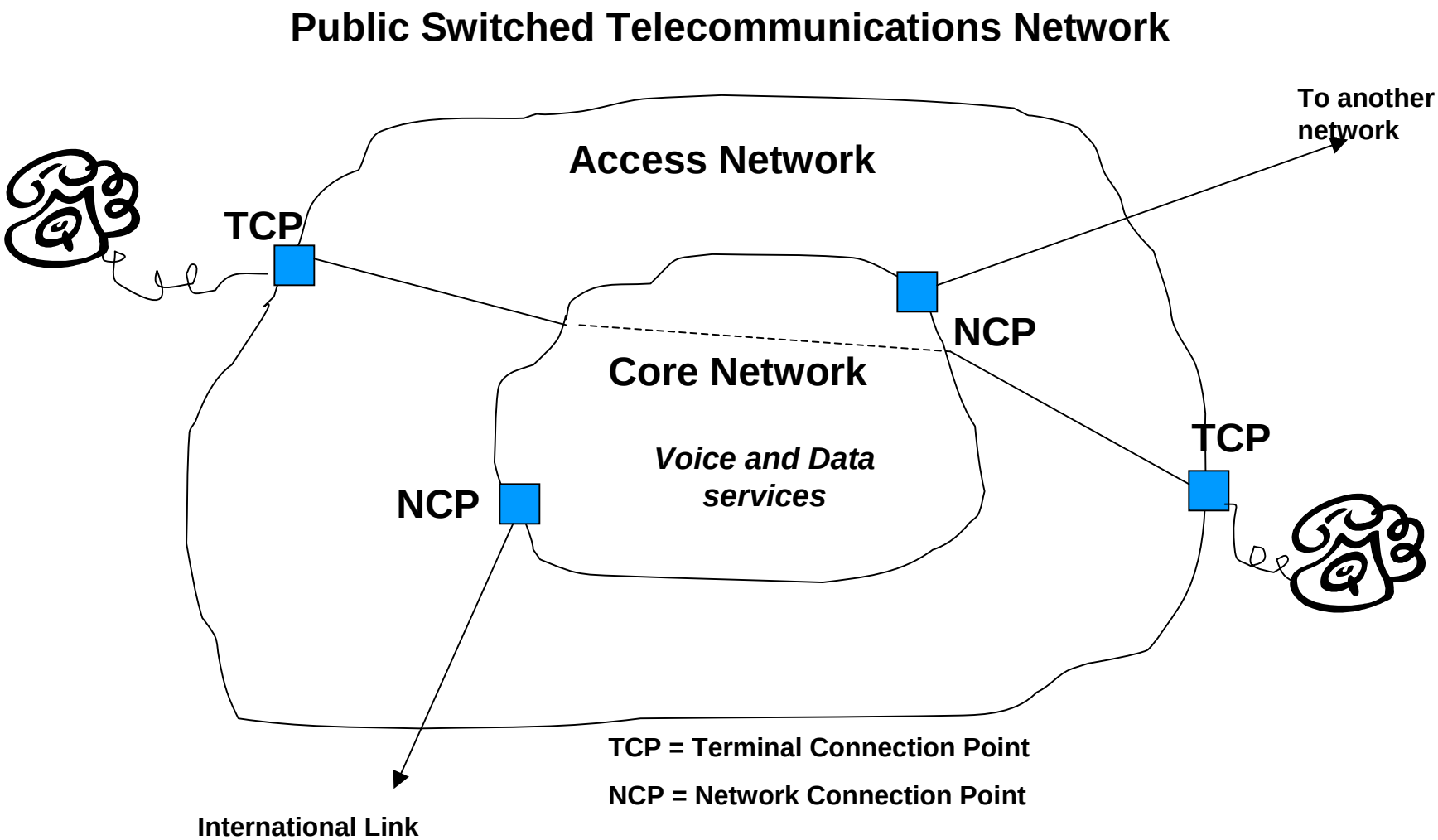
-Wireless systems

-Microwave links

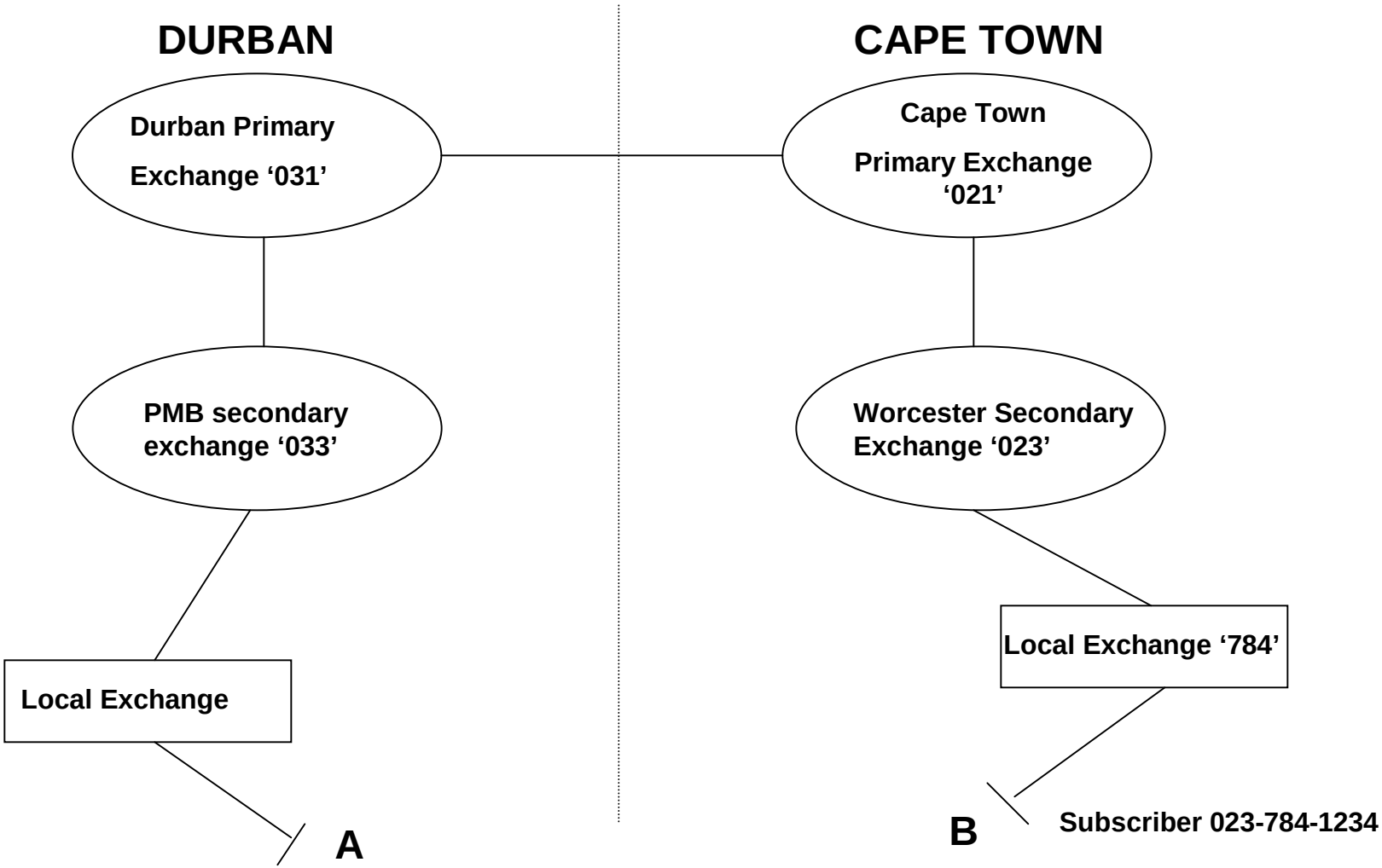
-Satellite systems

-Switches

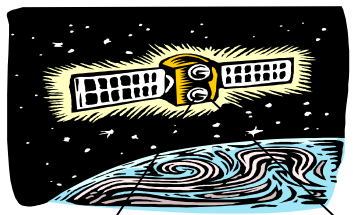
THE PSTN – Act Section 36B



LONG-DISTANCE CALL BETWEEN TWO PRIMARY AREAS



ROUTING OF AN INTERNATIONAL CALL



Dials 0944-20-XXXX

Telkom's National Network

United Kingdom

Satellite earth station

International Exchange

Undersea cable station

Question and Answer Session

Numbering Plans

Stakeholders

- ITU-T
- POLICY MAKERS
- NRAS
- INCUMBENTS
- NEW ENTRANTS
- CUSTOMERS

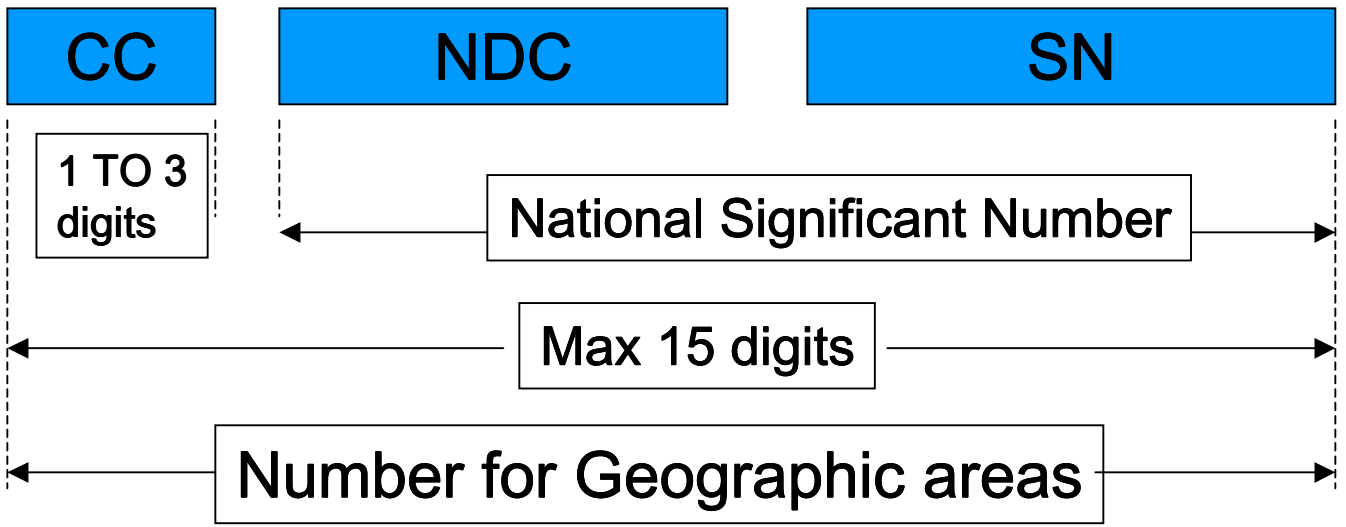
Numbering Plan Requirements

- Customer requirements
- Industry requirements
- Competitive requirements

ITU-T E. 164

The International Public Telecommunication Number Structure Recommendation E.164

International Telecommunication Number Structure-E.164



CC - Country Code
NDC - National Destination Code
(ND code,Trunk Code or Area Code)
SN - Subscriber Number

Number Formats

GEOGRAPHIC

INTERNATIONAL : + CC NDC SN

+ 44 28 256 42715

where '+' is the International prefix 09/00

NATIONAL : ONN ABC XXXX

012 311 1892 (Telkom)

012 388 XXXX (SNO)

Closed/Open Numbering Schemes

- A *closed* scheme has a single dialling procedure for an entire country; it usually, though not necessarily, has a single uniform number length

- An *open* scheme has separate local and trunk dialling prefixes; the lengths of codes and subscriber numbers may vary

SA Numbering Plan

The South African Numbering Plan is planned and managed according to telecommunications law (i.e. Section 89 of Act 103 of 1996) and regulations

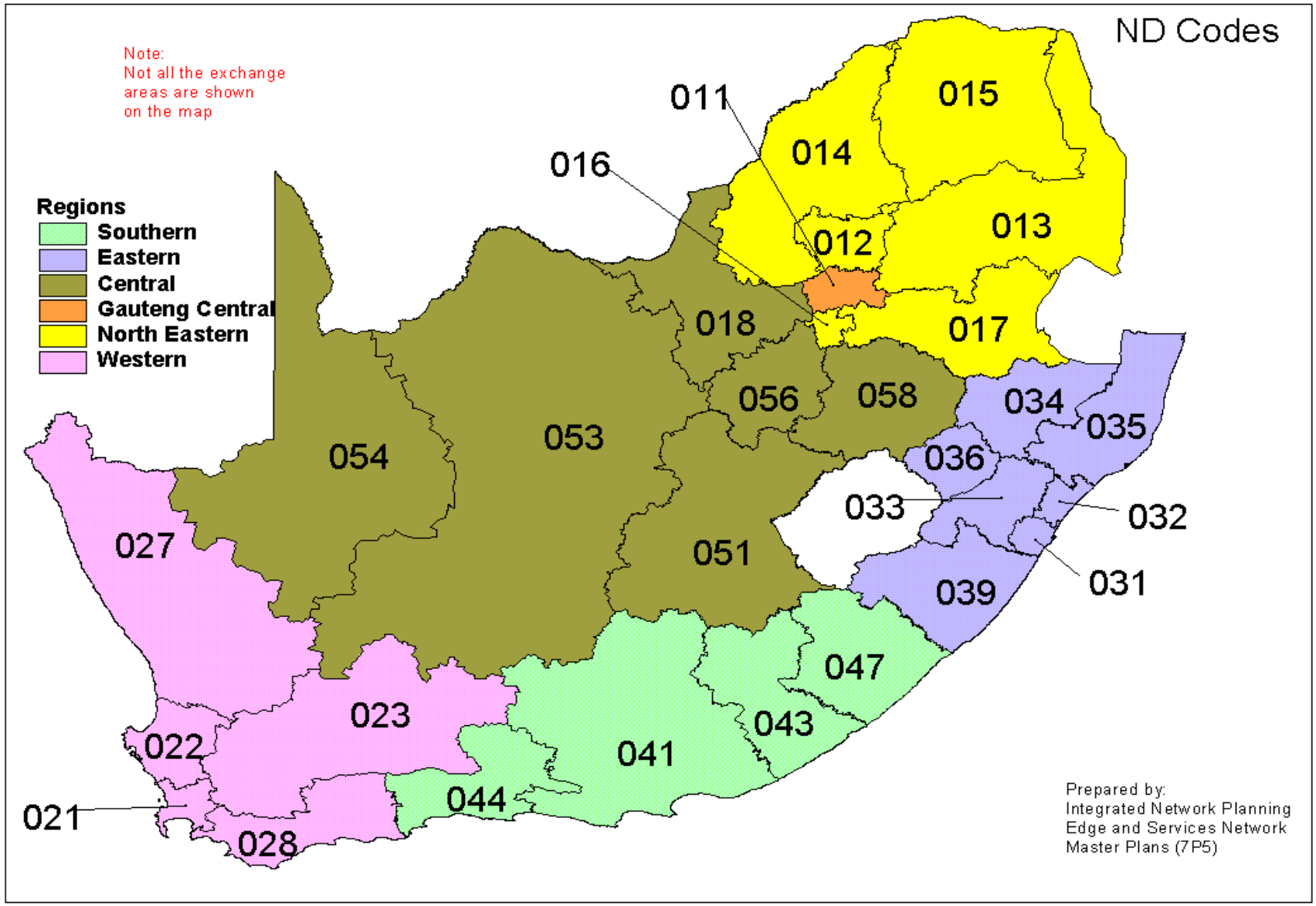
Existing Plan

- PSTN Format – 0 NN ABC XXXX
- Geographic Numbering
  - working: 01, 02, 03, 04, 05
  - 06 spare
- Non-geographic numbering
  - Telkom's enhanced voice services: 080, 086, 088, 089, 087 – spare
  - Mobile Cellular: 08x and 07x
  - 081 GMPCS
  - 085 reserved for new mobile operator

Level 1 Short Codes

- Type A – mandatory (e.g. 10111)
- Type B – For services across networks (e.g. TSA & SNO)
- Type C – For on-net services

Allocation of ND codes



Changing Environment

EXISTING PLAN

- Monopoly
- Limited competition
- Constant growth
- No real pressure on numbering resource except for GC

FUTURE PLAN

- Optimised for competition
- Explosive growth
- Complex environment
- Persistent pressure

Major impact of the new numbering plan

- Introduction of 00 as International Prefix.
- Introduction of code 112 as the new National Emergency Service code.
- Introduction of code 1020 for the public to access Government directory information services free of charge.
- Introduction of Carrier Selection/Pre-Selection
- Introduction of Number Portability
- Voice over Internet Protocol (VoIP)

Question and Answer Session

COA/CAM

USE OF FINANCIAL INFORMATION

- Financial Accounting
  - Costs defined in terms of financial statements
  - Historical investments / recent revenue, expenses, assets & liabilities
  - For external decision makers: investors, creditors, suppliers
- Management Accounting
  - Include forward-looking costs for decision making and cost management (e.g how to optimise revenue, which products or services, at what price?)
  - For internal decision makers: management
- COA/CAM
  - Chart of Accounts / Cost Allocation Manual

PURPOSE OF COA/CAM

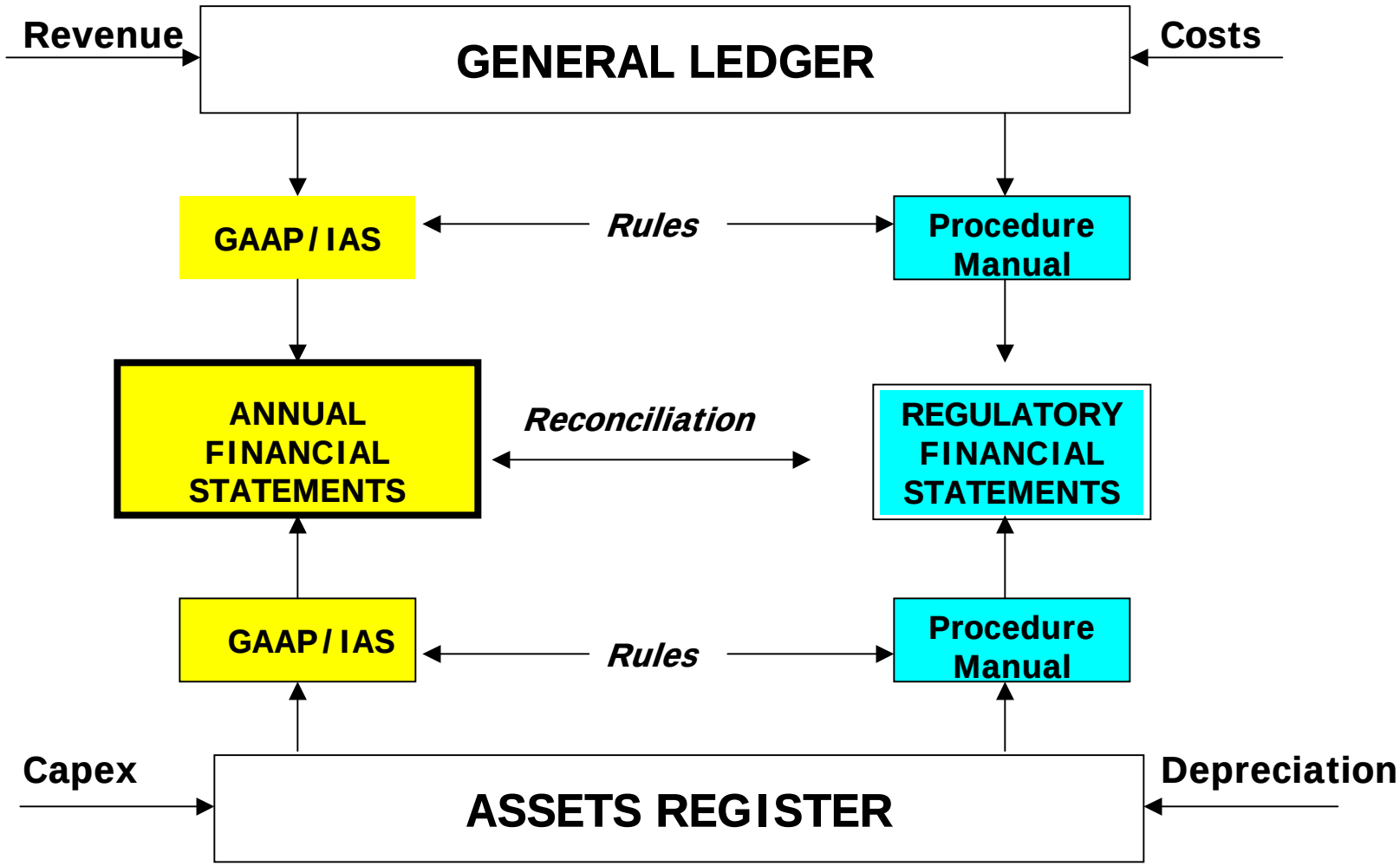
To ensure that:

- Operators do not price below cost to exclude competition (predatory pricing)
- Operators do not engage in anti-competitive cross-subsidisation
- Operators do not price on unduly discriminatory basis
- Charges are cost oriented and sufficiently unbundled

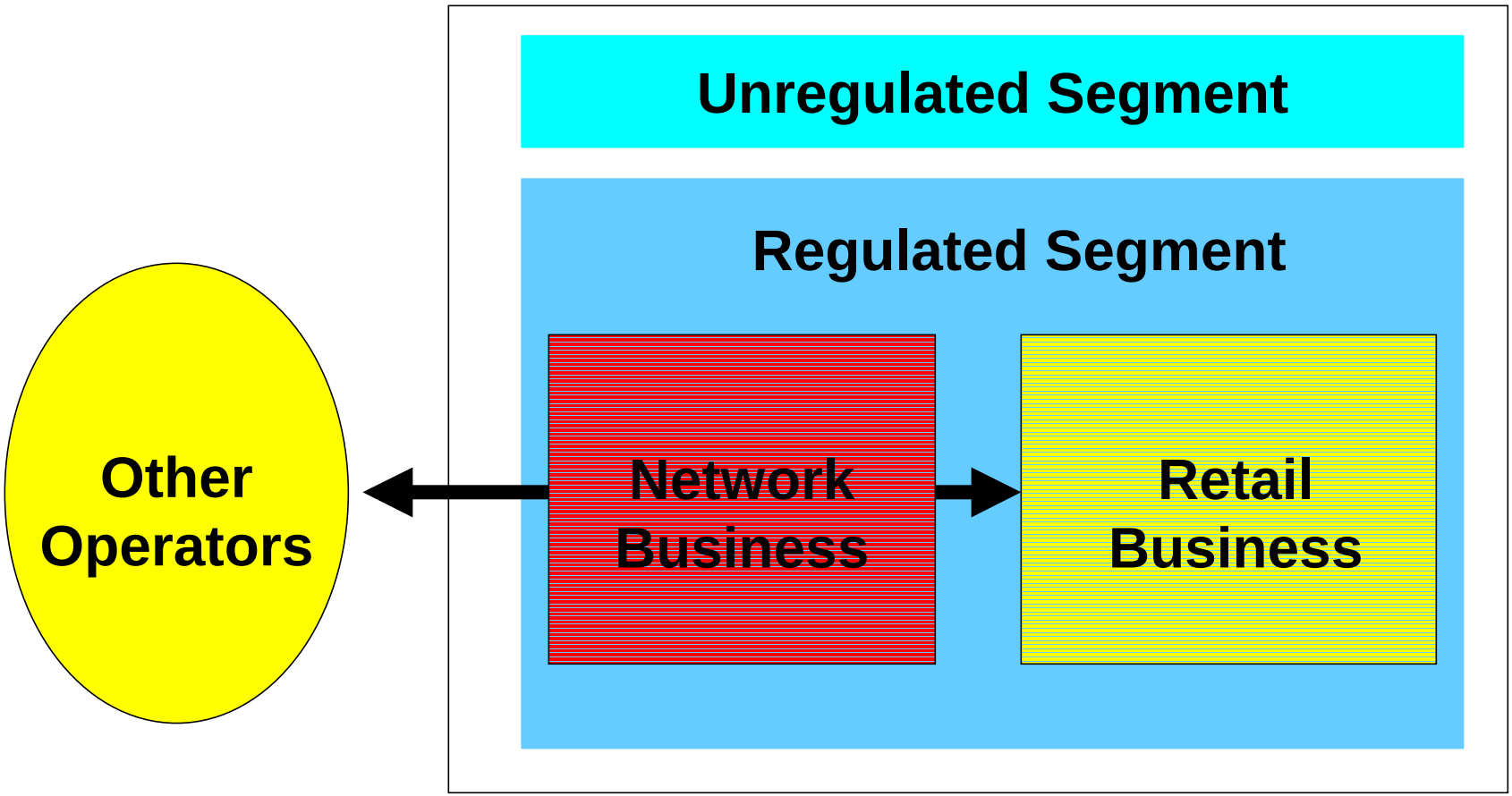
REGULATORY ACCOUNTS

- COA
  - Chart of Accounts
  - list of accounts (account definitions)
- CAM
  - Cost Allocation Manual
  - framework / broad rules for allocating costs (separations methodologies)
- Procedures Manual – ‘book of implementation’
- RFS – Financial statements

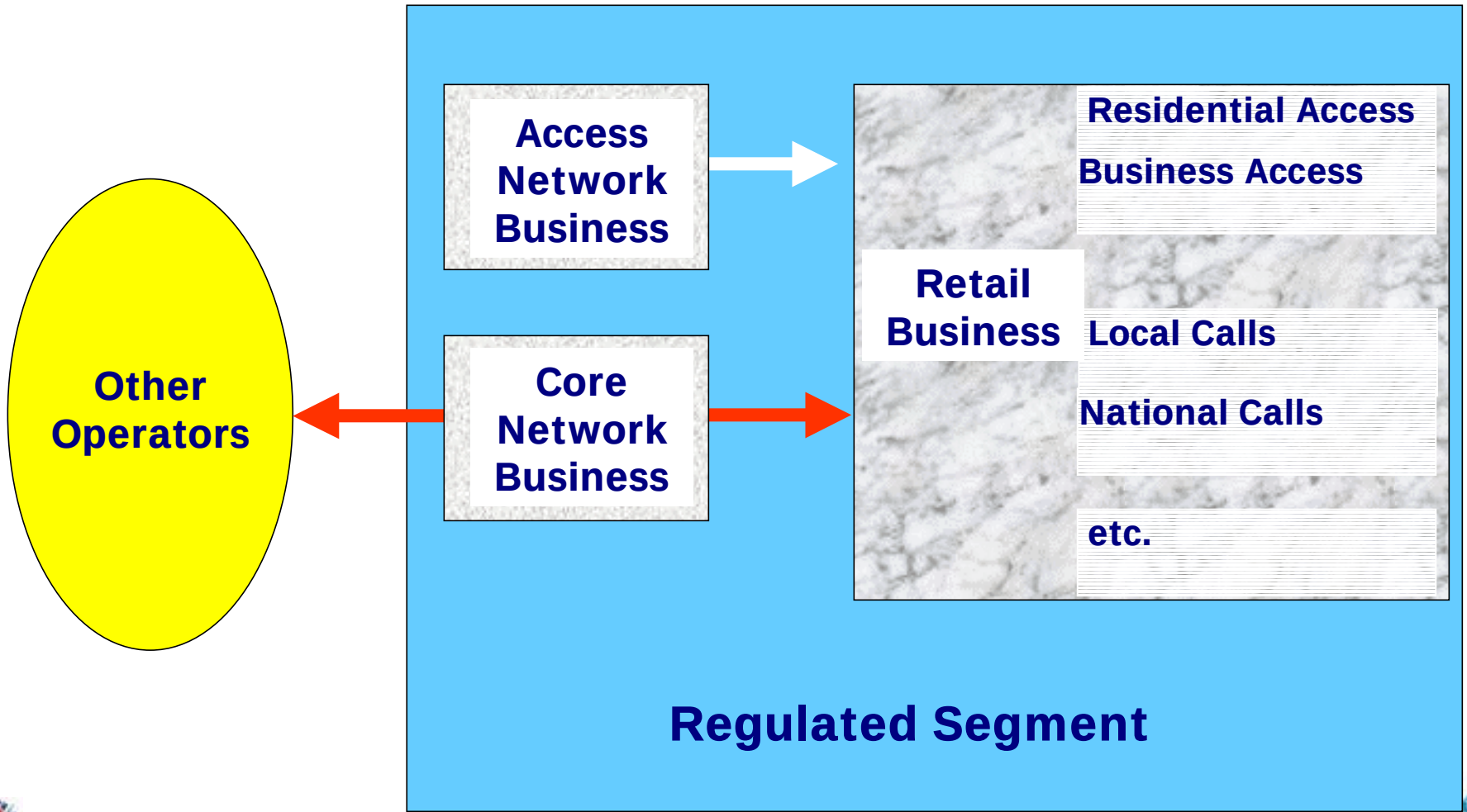
FINANCIAL STATEMENTS



DISAGGREGATION OF SEGMENTS



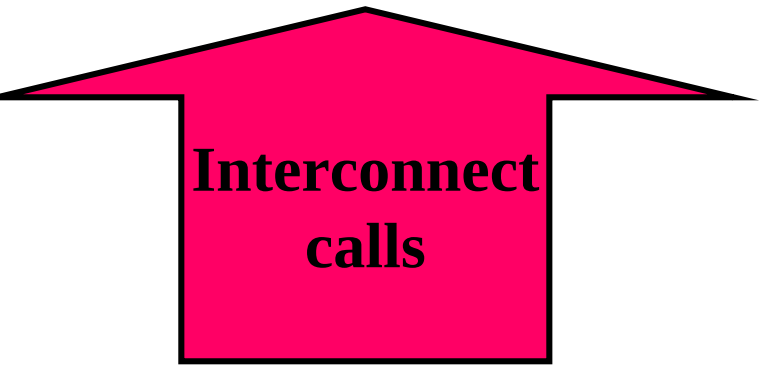
DISAGGREGATION OF SEGMENTS



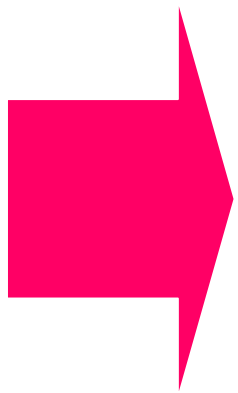
NO DISCRIMINATION BY NETWORK

Other Operators

Customers



Network Business



Retail Business

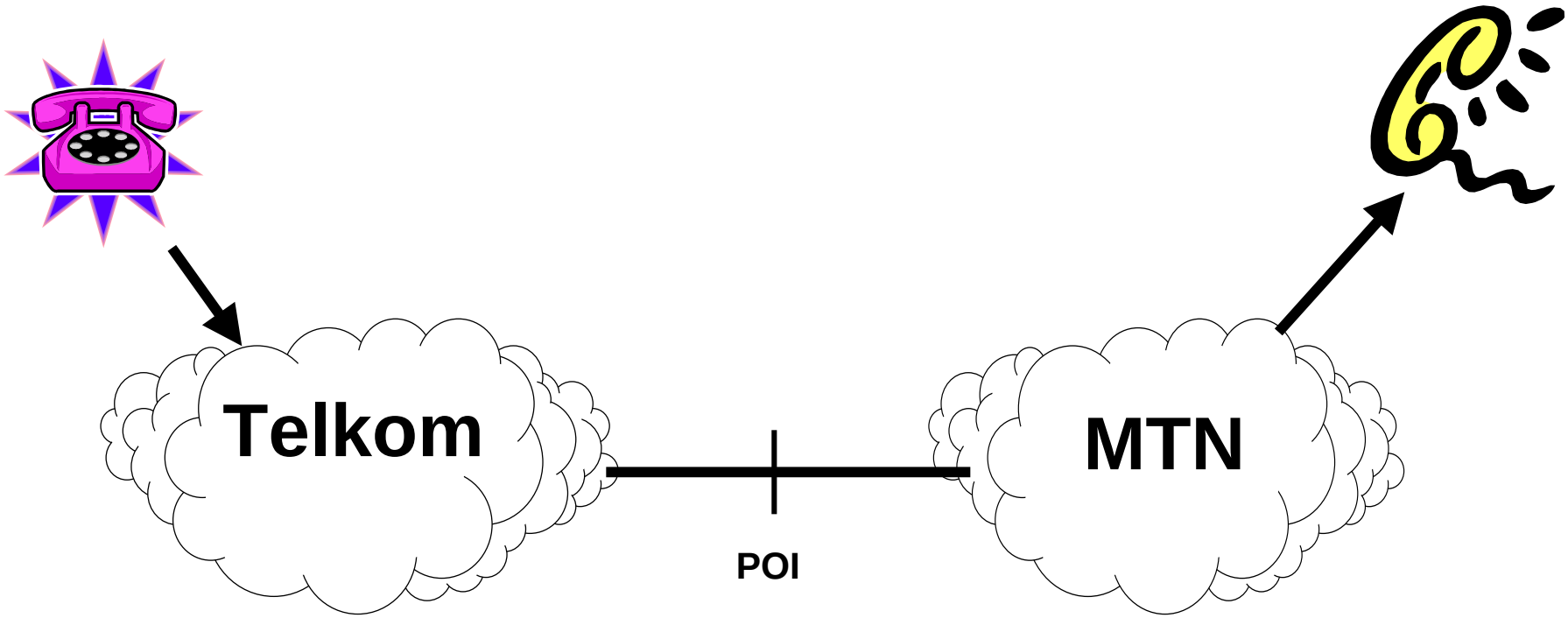
Question and Answer Session

INTERCONNECTION

INTERCONNECTION

The logical and physical linkage of two networks so that customers of one network can communicate with customers of the other network or access services provided by such network

INTERCONNECTION

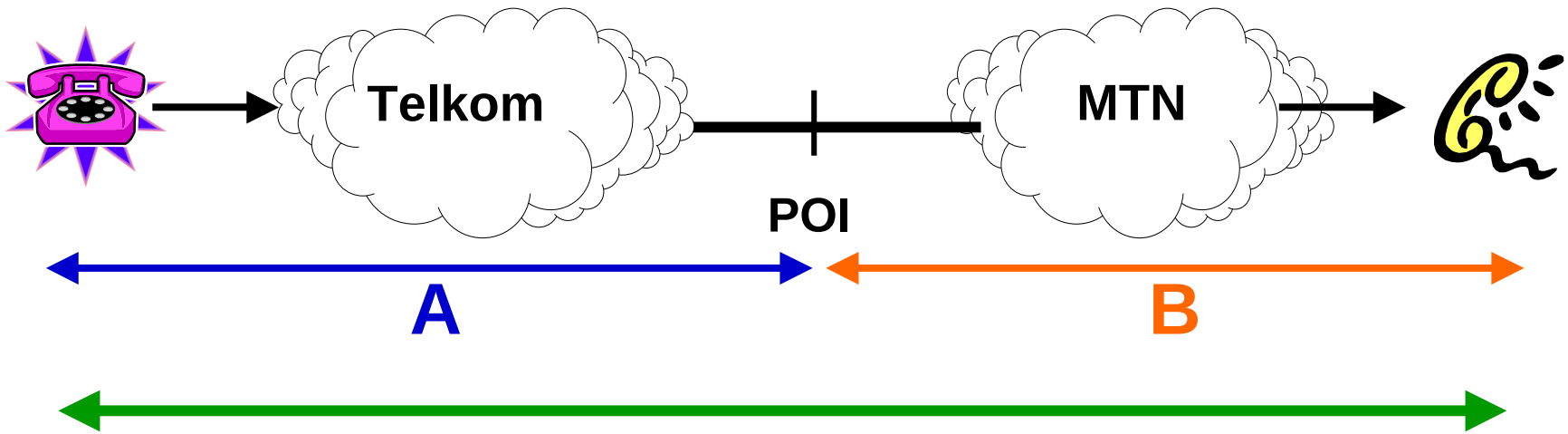


Call originates on Telkom network

Call terminates on MTN network

MTN provides call termination

INTERCONNECTION

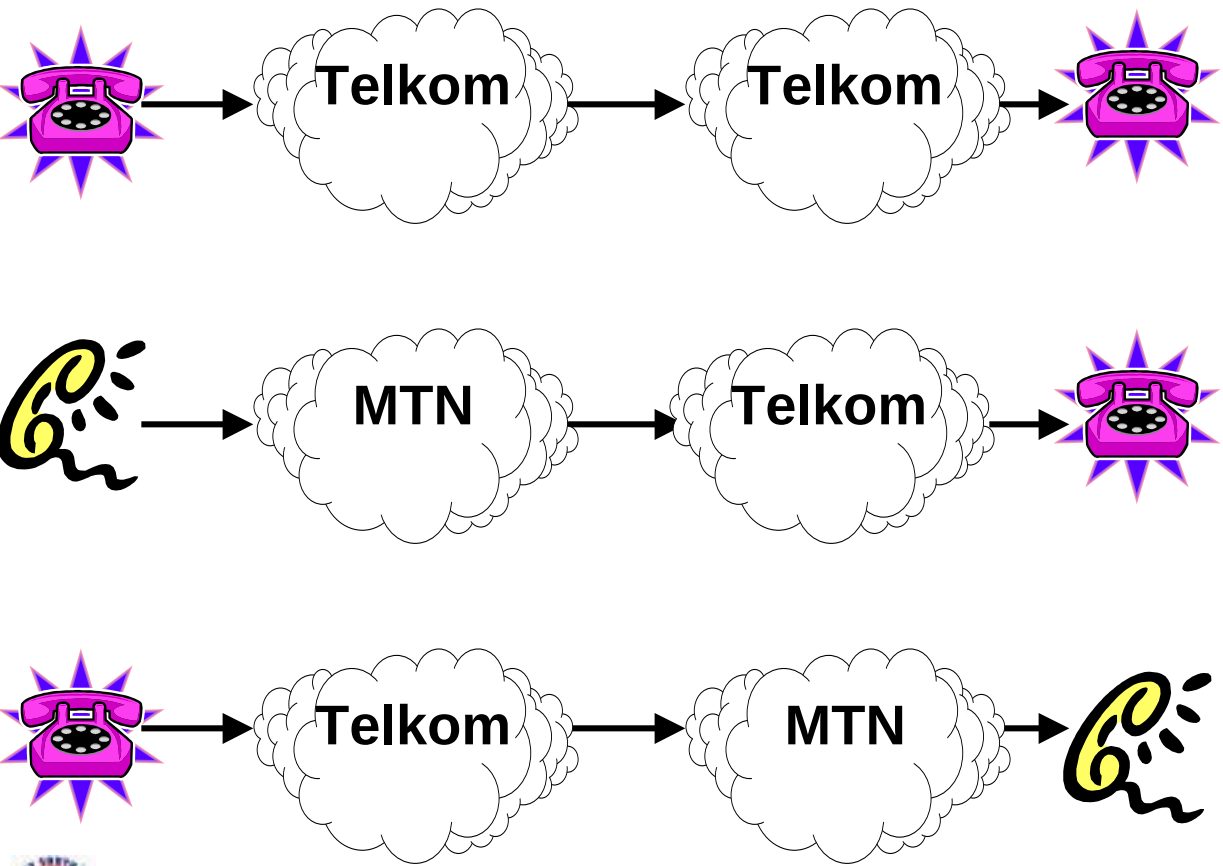


Telkom – call origination charge (A)

MTN – call termination charge (B)

Retail charge to customer = A + B

CALL TERMINATION RELATIONSHIPS



The Money

Collects	ICX Fee
Telkom	-
MTN →	Telkom
Telkom →	MTN

CONTENTS OF AGREEMENTS

- scope and specification of interconnection
- service levels and the maintenance of quality of service
- charges for interconnection
- billing and settlement procedures
- ordering, forecasting, provisioning and testing procedures
- the provision of POI and Interconnection Capacity
- the transmission of CLI
- technical specifications and standards
- traffic and system management, maintenance and measurement

Question and Answer Session

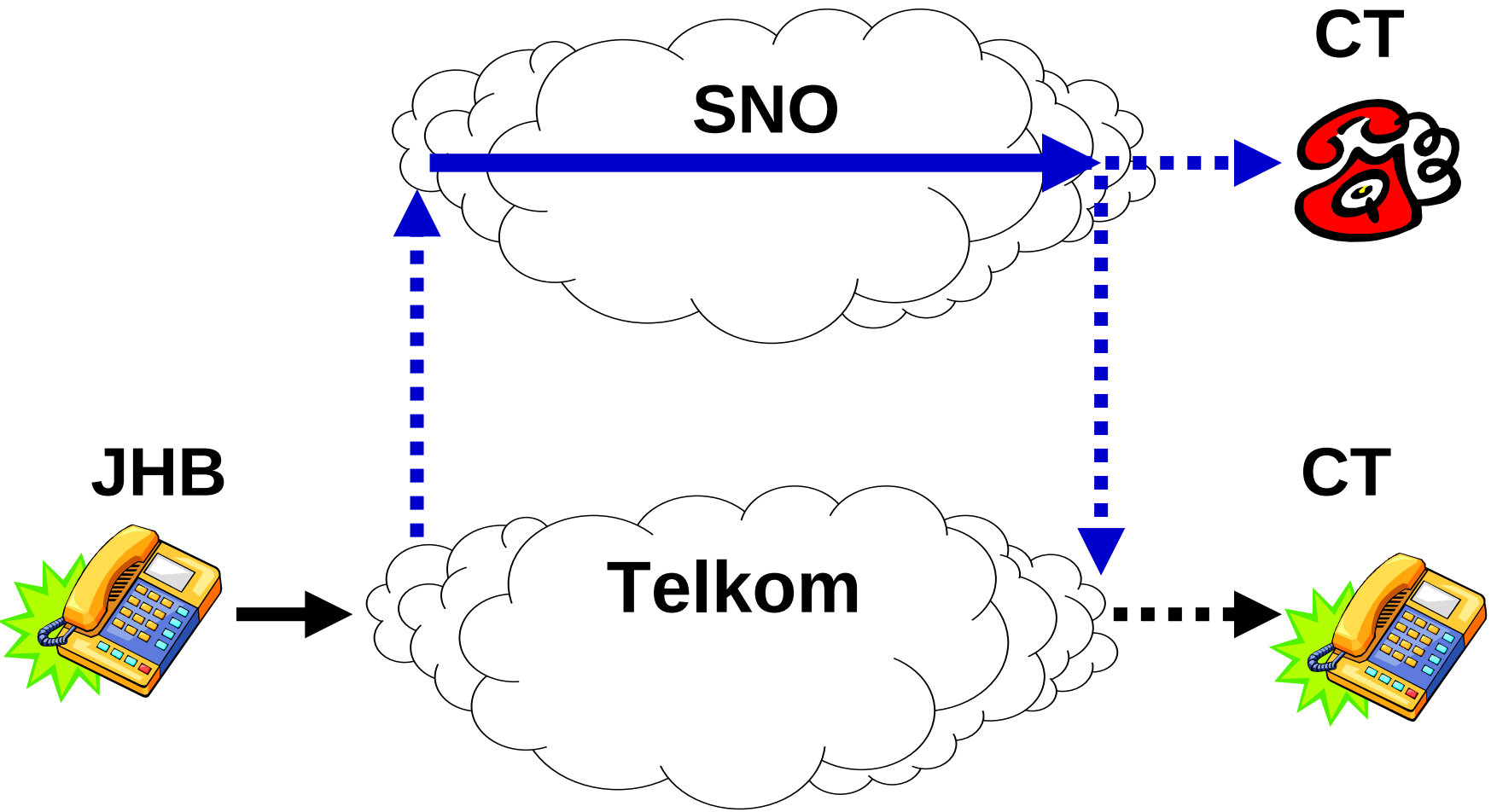
CARRIER PRE-SELECTION
CARRIER SELECTION

What is CPS & CS?

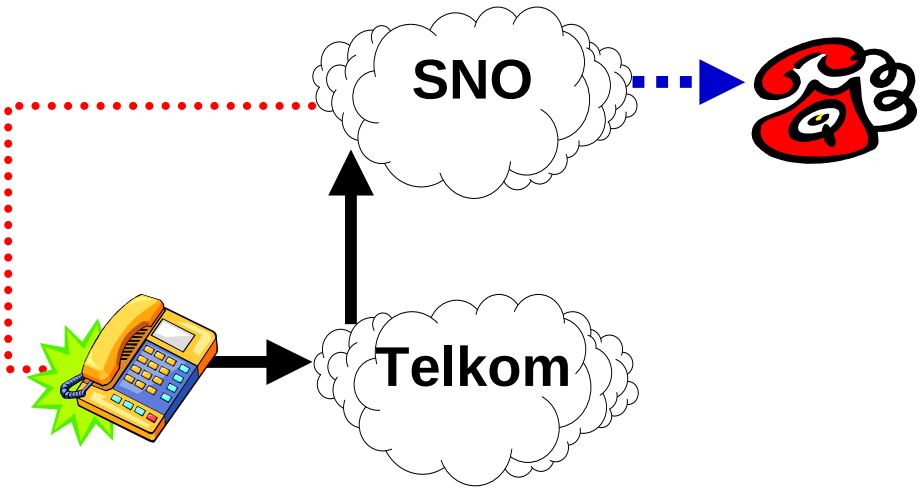
- **Carrier Pre-selection**
  - Automatic choice to use another Operator's network for national long distance and/or international calls
  - No Prefix code required
  - Can choose to override choice on call-by-call basis

- **Carrier selection**
  - Manual choice to use another Operator's network for national long distance and/or international calls on a call-by-call basis

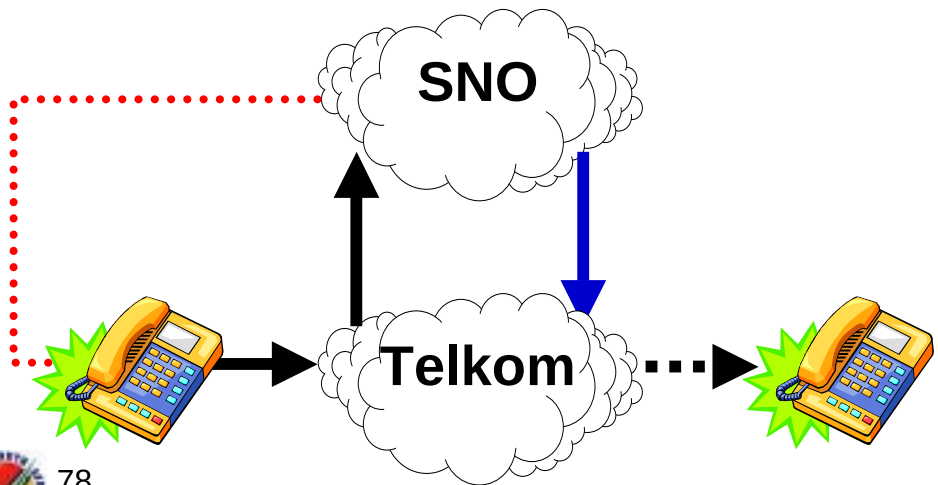
CARRIER PRE-SELECTION



CALL TERMINATION RELATIONSHIPS



	The Money	
Collects	Orig Fee	ICX Fee
SNO	Telkom	-



SNO	Telkom	Telkom

COST OF CARRIER PRE-SELECTION

- **Initial set-up costs**
  - **Conditioning of the networks**
  - **Customers' support systems**
- **Per Operator Set-up costs**
  - **Technical and commercial arrangements to accommodate each new alternative operator**
- **Customer Set-up costs**
  - **Service set-up, management, change, discontinuation for each individual customer**

RECOVERY OF COSTS

- **Initial set-up costs**
  - **Each providing operator bears own costs**
- **Per Operator Set-up costs**
  - **From CPS operator concerned**
- **Customer Set-up costs**
  - **From CPS operator concerned**

Question and Answer Session

NUMBER PORTABILITY

NUMBER PORTABILITY

- **The ability of a customer to retain his / her telephone number when:**
  - changes from one operator to another
  - moves location
  - changes service

DIFFERENT TYPES OF NP

- Service Provider / Operator NP
  - customer changes service providers and keeps the same telephone number
- Geographic / location NP
  - customer changes location and keeps the same telephone number
- Service NP
  - customer changes service and keeps the same telephone number

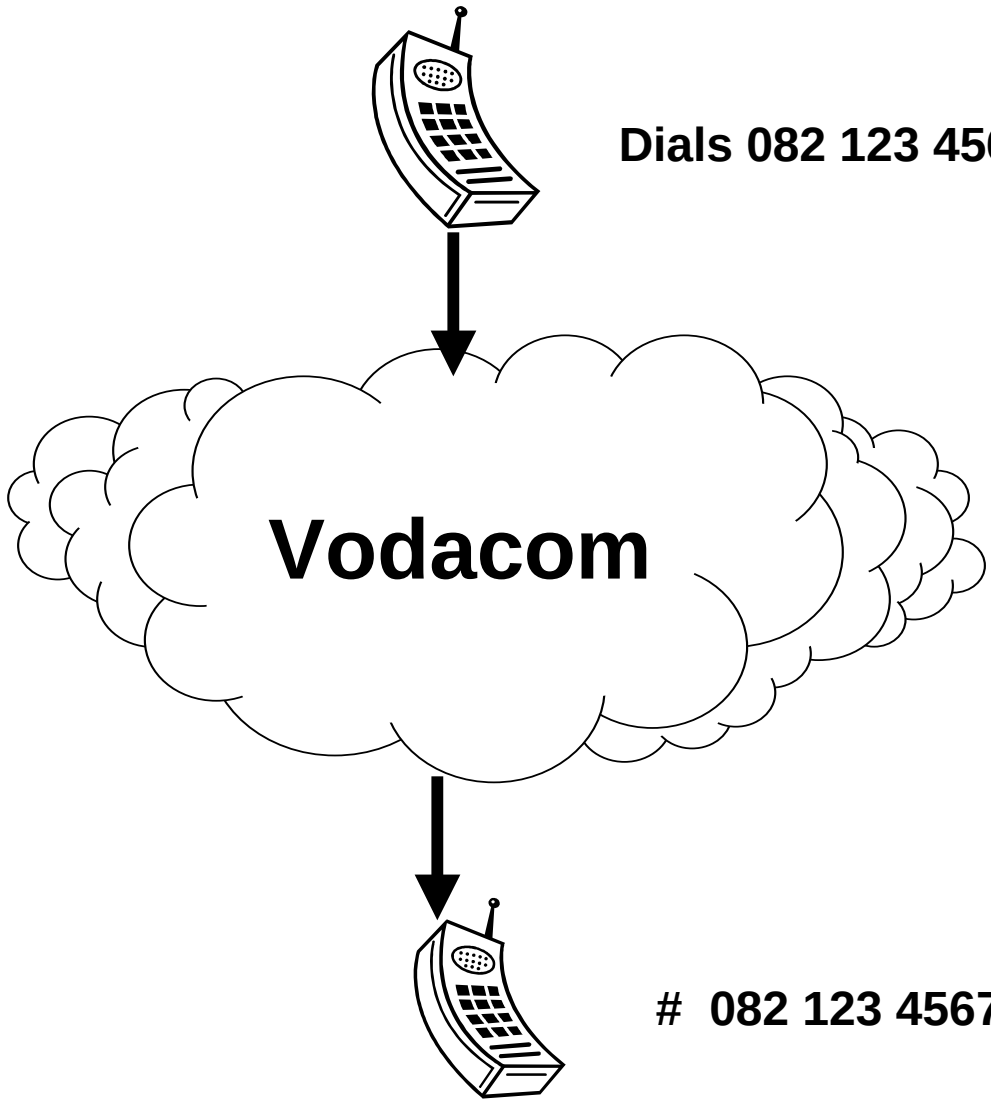
NP IN TELECOMS ACT

NP is defined in the Act as a capability whereby a subscriber to a telecommunication service who so requests can retain his or her telephone number when changing service from one PSTS licensee to another PSTS licensee or one mobile cellular telecommunication service licensee to another mobile cellular telecommunication service licensee

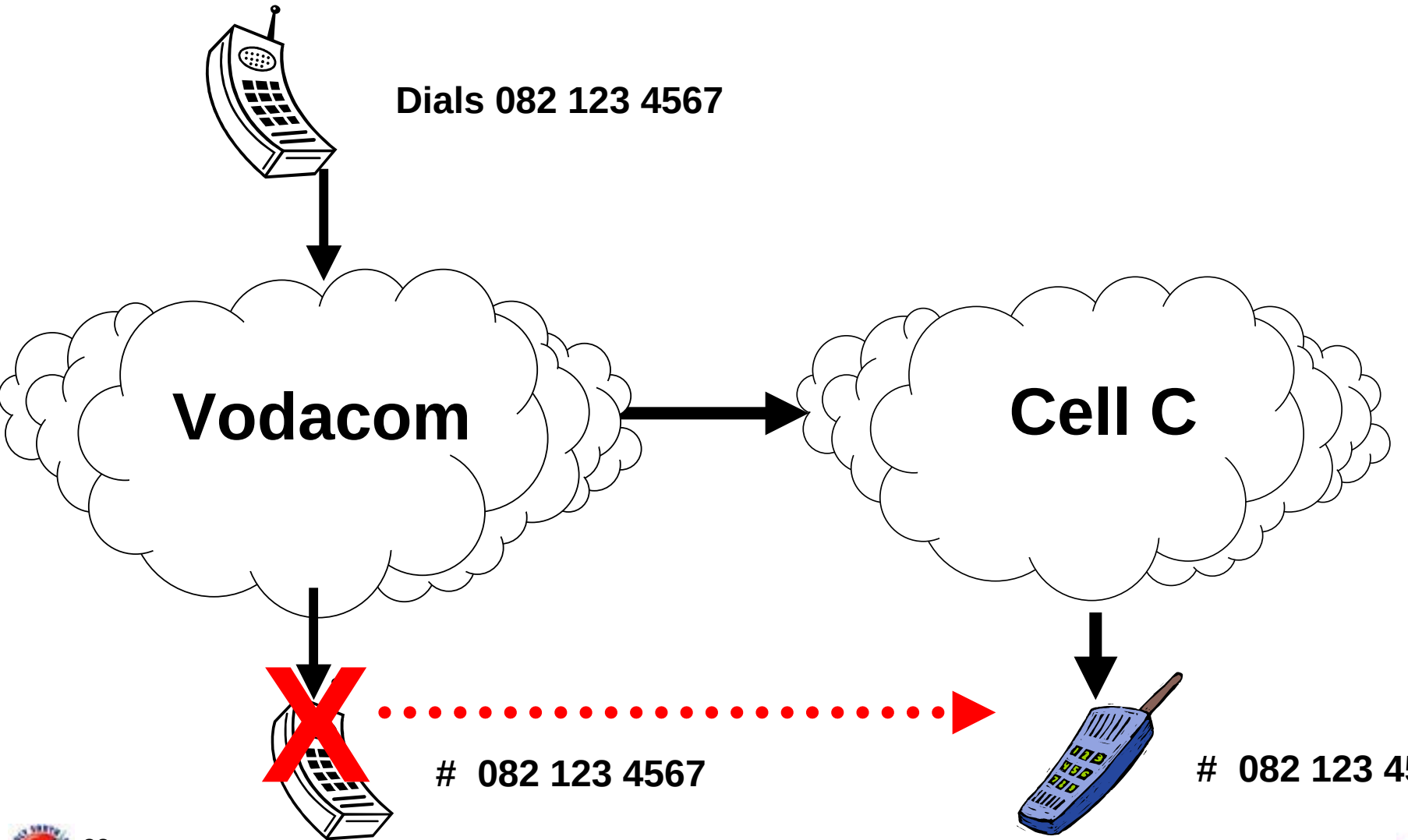
OPERATOR PORTABILITY IN SA

- Fixed to Fixed
  - Block Portability
  - Individual NP
- Mobile to Mobile

CALL ON OWN NETWORK



CUSTOMER HAS PORTED



CUSTOMER HAS PORTED

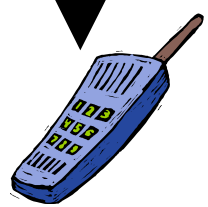
Dials 082 123 4567

- Customer moved from Vodacom to Cell C
- Customer retains telephone number

Donor Operator

Recipient Operator

082 123 4567



082 123 4567

COST OF IMPLEMENTATION

- **Initial set-up costs**
  - **Conditioning of the networks**
  - **Procedures / systems for interworking between operators**
- **Customer porting costs**
  - **Cancellation/creation of accounts**
  - **Co-ordinated switch over**
- **Additional conveyance costs**
  - **Re-routing from Donor network to recipient network**

RECOVERY OF COSTS

- **Set-up costs**
  - Each operator bears own costs
  - Subject to relevant price controls
- **Porting transaction cost**
  - Recipient Operator
- **Additional conveyance costs**
  - Each operator bears its own additional conveyance costs

Question and Answer Session

Network Planning and Management

CONTENTS

- Overview of the Network
- Network Statistics
- Network Planning
- Network Management
- Conclusion

TRANSFORMATION OF TELKOM'S VOICE NETWORK

Manual → **(1930)** → **Electromech**

Magneto (crank handle) signalling

Loop disconnect (rotary dial) signalling

Electromech → **(1980)** → **TDM Digital**

Multi-frequency (push button) signalling

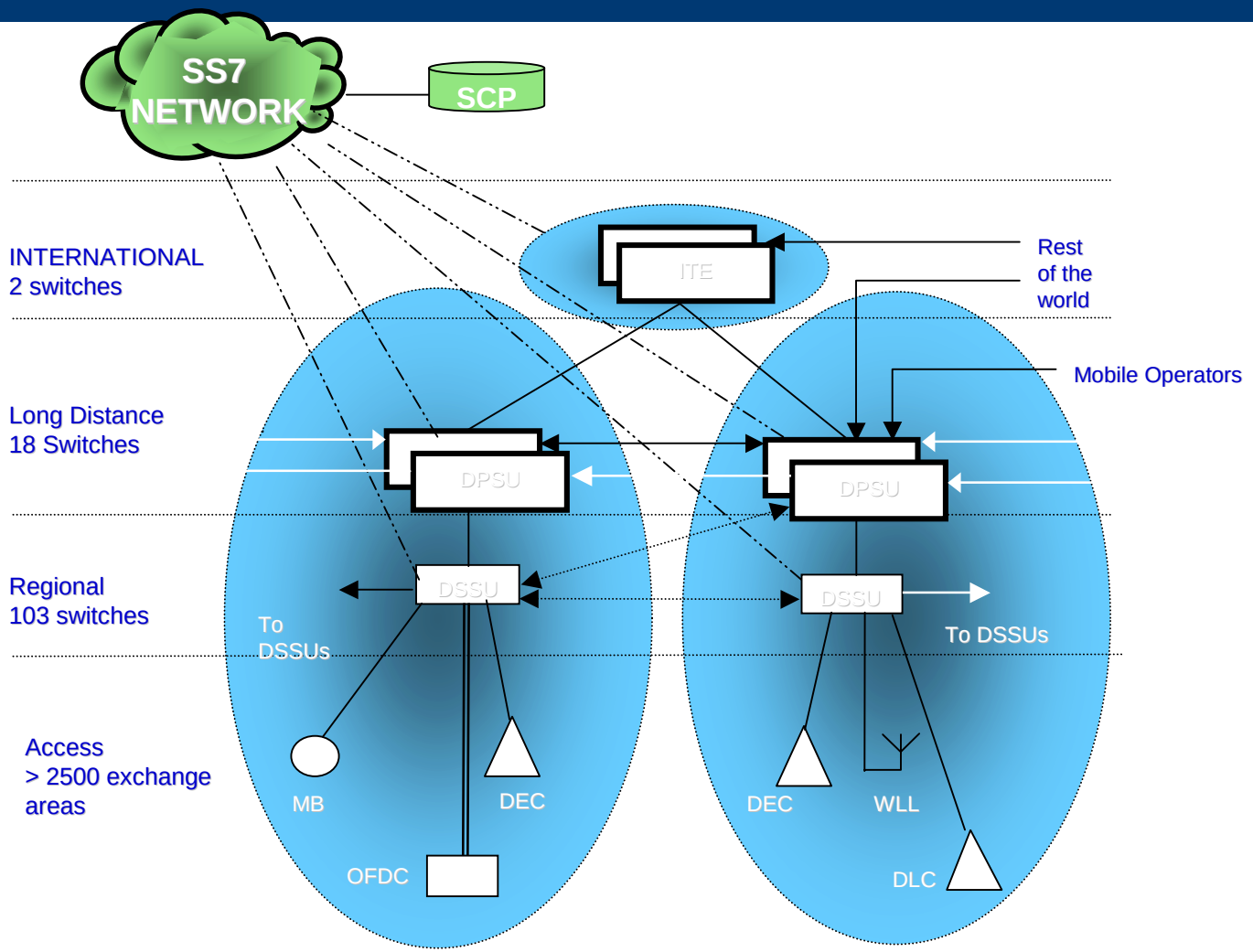
TDM Digital → **(TODAY)** → **Packet**

IP ("mouse" click) signalling

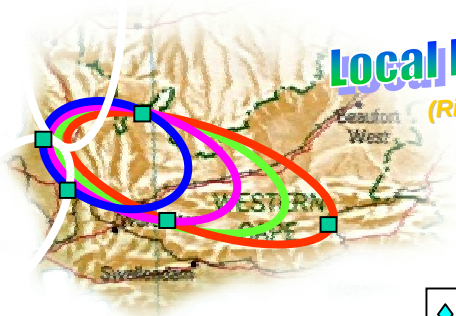
Increased operating efficiency and effectiveness

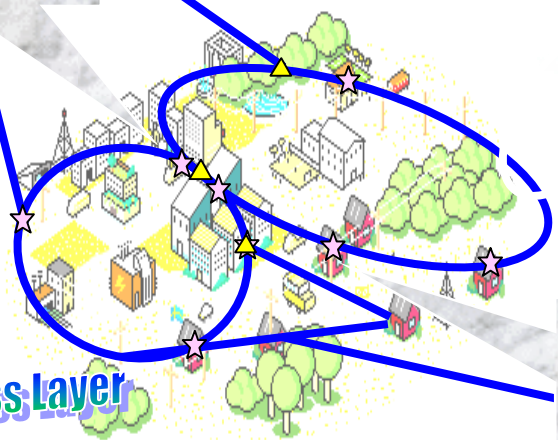
Increased range of services and applications

VOICE NETWORK

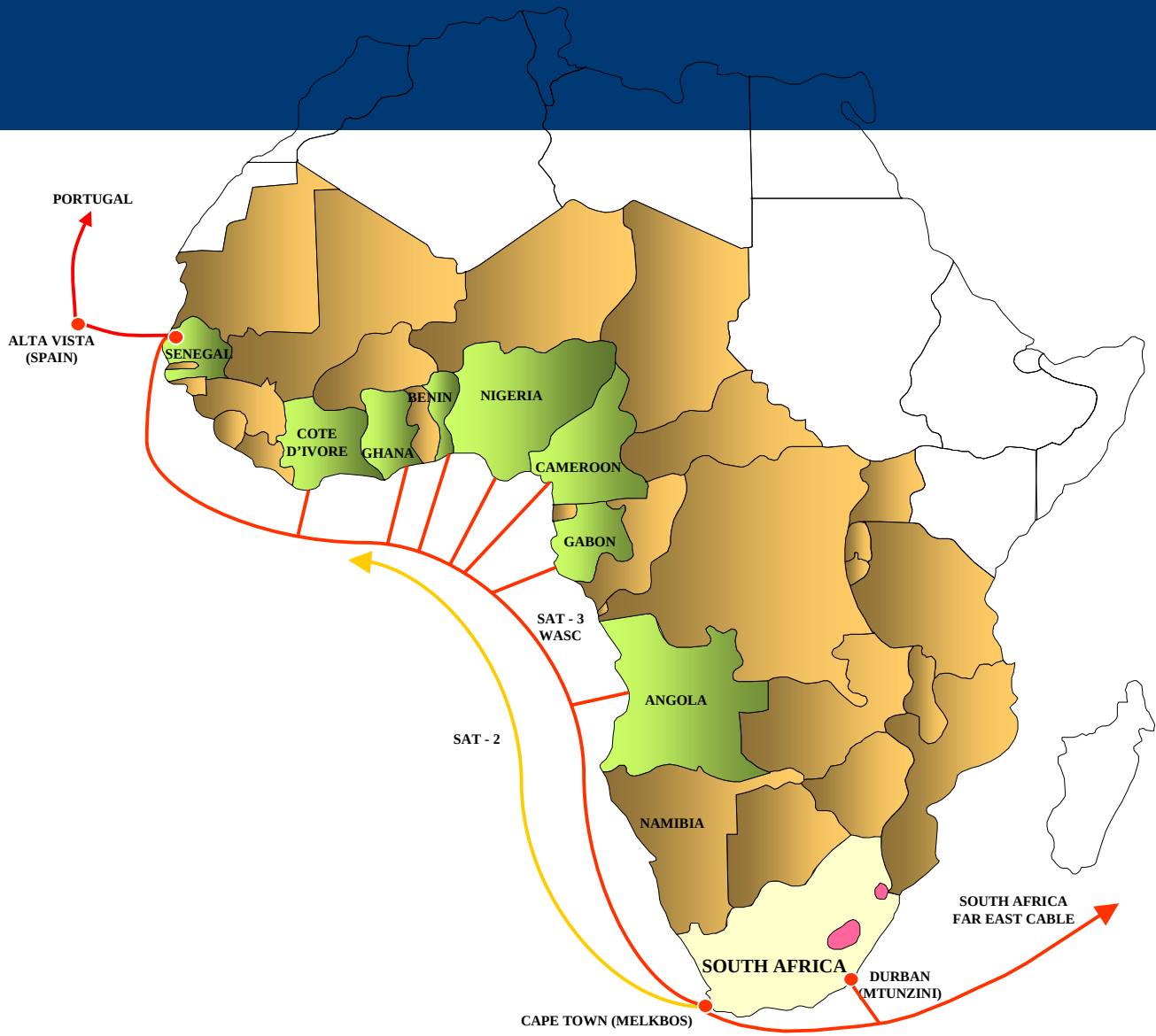


TRANSMISSION NETWORK





- National Layer Hub-node
- Local layer Hub-node
- Customer node
- Telkom Access layer node

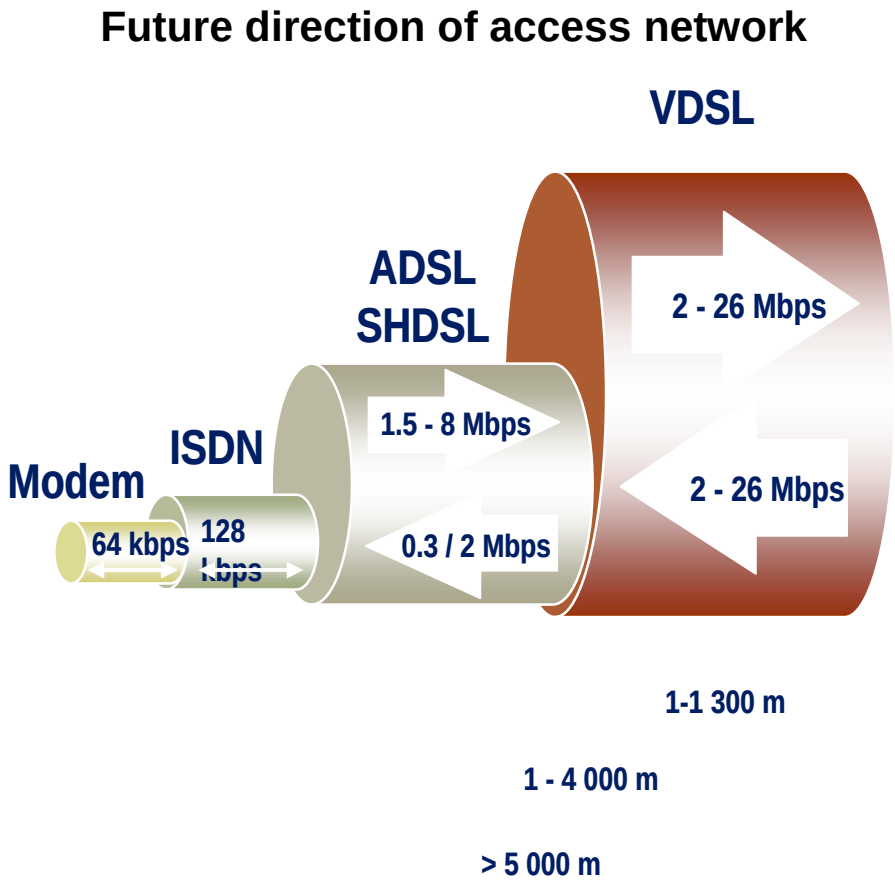

PORTUGAL
ALTA VISTA
(SPAIN)
SENEGAL
BENIN
NIGERIA
COTE
D'IVORE
GHANA
CAMEROON
GABON
SAT - 3
WASC
SAT - 2
ANGOLA
NAMIBIA
SOUTH AFRICA
FAR EAST CABLE
SOUTH AFRICA
DURBAN
(MTUNZINI)
CAPE TOWN (MELKBOS)
Operator - owned cable
Submarine cable
Landings of SAT - 3 / WASC
African Countries that can access SAT - 3 / WASC
via terrestrial and satellite links

DATA NETWORK - SERVICES

- Constant Bit Rate Services
  - Voice Grade Leased Line
  - Diginet
  - Diginet Plus
- Frame Relay
  - Frame Express
  - Managed Frame Relay Express
- Asynchronous Transfer mode
  - Broadband data services
  - 2 Mbps to 149 Mbps
- Internet Protocol
  - Dial-up internet access
  - Corporate Internet access
  - Virtual Private Networks
  - International

Access network deployed

- Access network consists of
  - Mainly copper
  - Radio technologies deployed in rural areas
  - Fibre deployed in high-end of the market
  - Access network supports basic voice to broadband



Statistics

- Voice network (99.9% digital)
  - > 4,800,000 telephone access lines
  - 120 Digital switching units
  - Access points of presence (wireline and wireless) covering 2500 exchange areas
  - > 10,000,000 access lines (wireline and wireless)
  - 658,798 ISDN channels
- IP network – 290,000 dial-up and 297 leased line Internet services, VPNs, VoIP.
- ATM network with 189 points of presences
- ADSL Footprint 62%

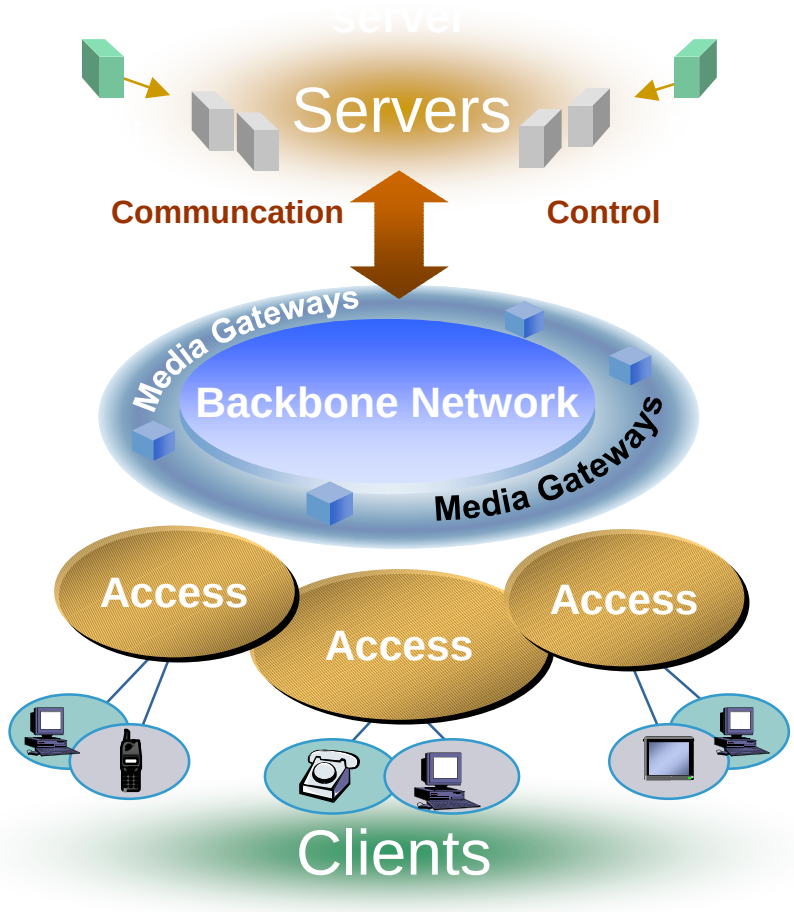
Data Networks

Network	National Nodes	Regional Nodes	Access Nodes
Constant Bit Rate (CBR)	75	197	3715
Asynchronous Transfer Mode (ATM)	12	37	140
Frame Relay	7	25	Uses CBR
Internet Protocol (IP)	6	16	63

Network Planning

- Evolutionary Network Approach
- Embedded Based Network
- Building Broadband Capacity In Support Of Fast Internet Services
- Fully Integrated Network
- Fully Protected Network

IMPACT ON NETWORK INFRASTRUCTURE



Planning for modern day telecommunications networks

- Complex concatenation of elements to provide a service
- Myriad of technologies to choose from
- Intricate standards and interconnection
- Customer requirements changes constantly

Network planning steps

- Forecasted demand translated into equipment and interconnecting requirements
- Combined with available technology and equipment dimensioning rules
- Optimisation models utilised to decide on the placement and density of node placement

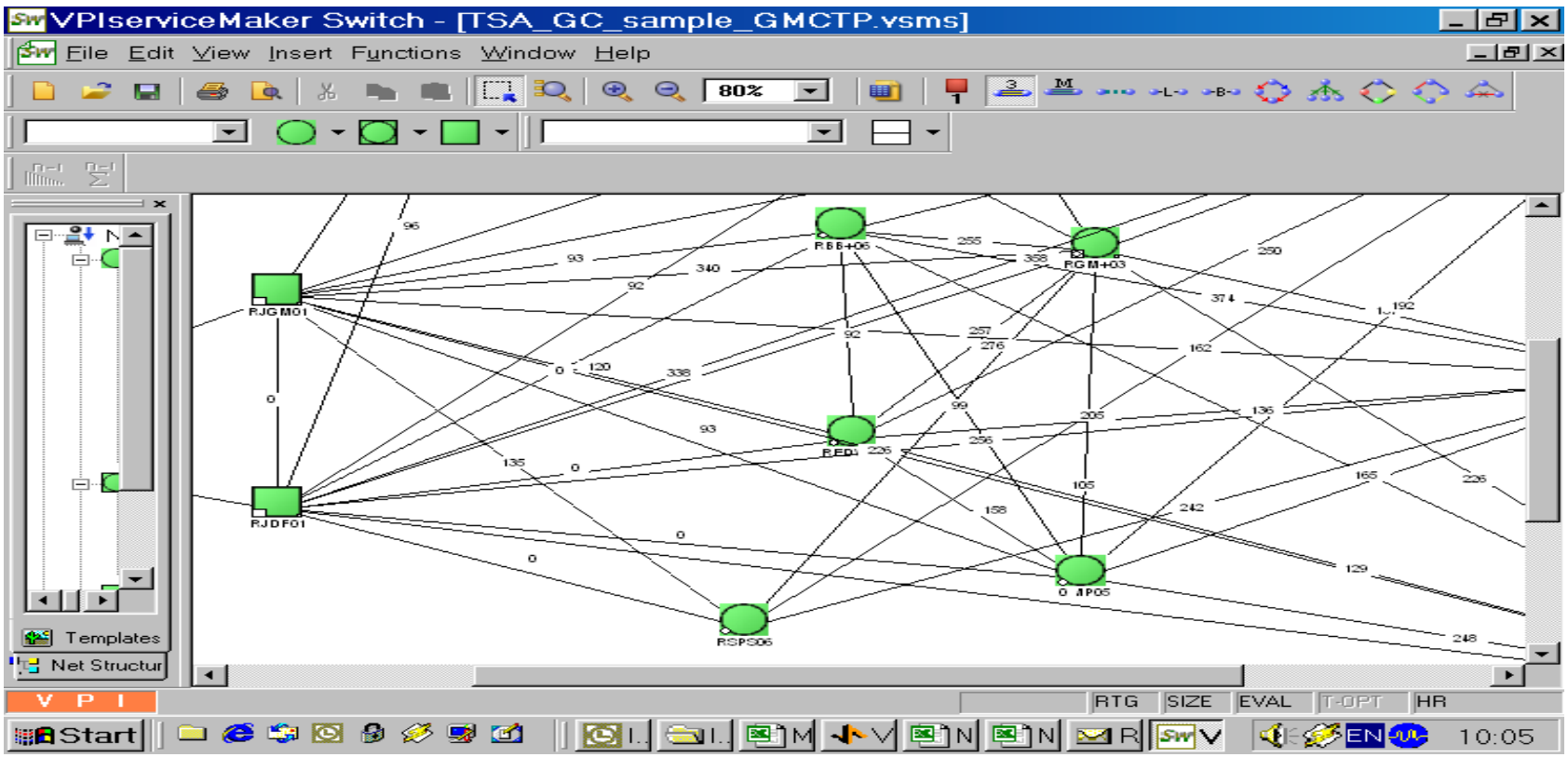
FORECASTING

- Dedicated Demand Forecast section.
- Uses Municipalities, Developers, Demographic information, etc. as input.
- Generates Forecast figures per service category per Exchange Area for 5 years.

ALPHACODE	EXCHNAME	RCON_2005	RCON_2006	RCON_2007	RCON_2008	RCON_2009	RPPP_2005	RPPP_2006	RPPP_2007	RPPP_2008	RPPP_2009
CAGG	AGGENEYS	157	147	138	130	123	148	160	170	178	184
CAHS	AUGRABIES	115	103	95	90	87	35	41	45	48	50
CAKH	ASKHAM	43	42	42	41	40	24	27	30	32	34
CALA	AMALIA	68	66	64	62	60	16	17	18	19	20

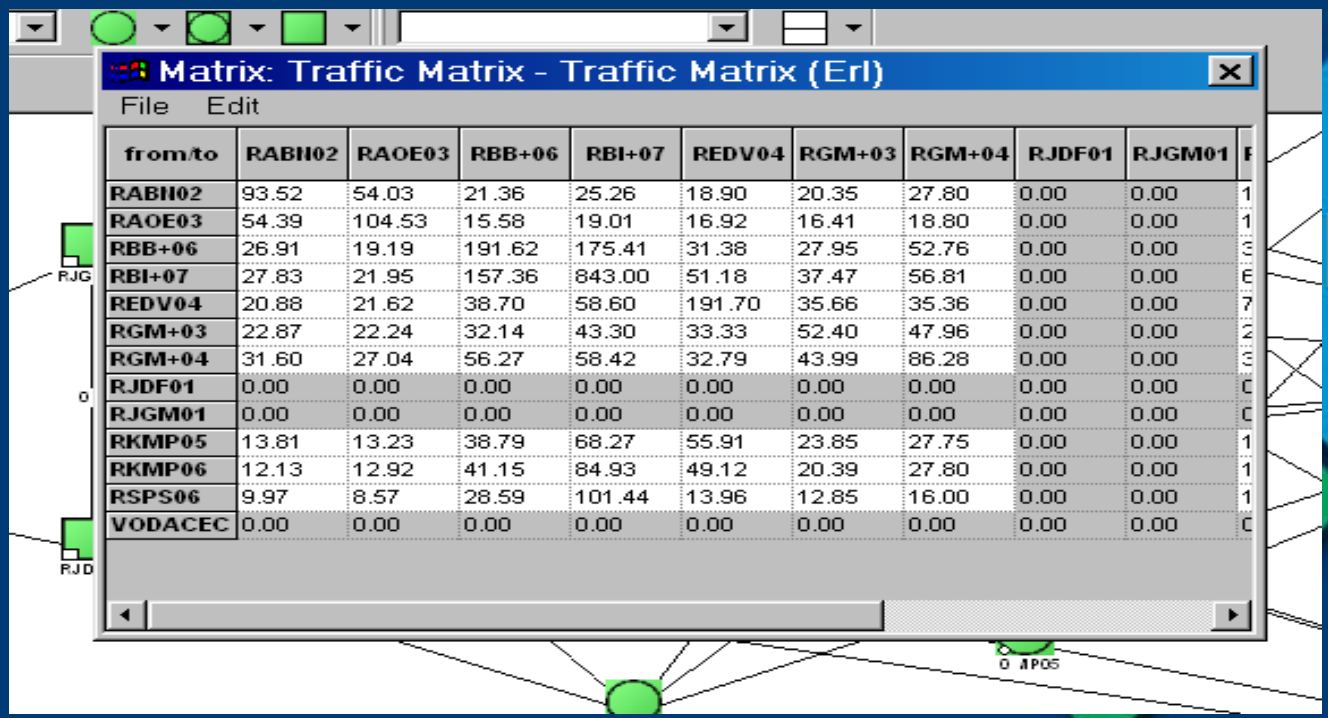
TRAFFIC MATRIX

- Networking Design Tools are used to dimension the network switches and inter switch trunks.



TRAFFIC MATRIX Continued

A typical example of an imported point to point traffic matrix.

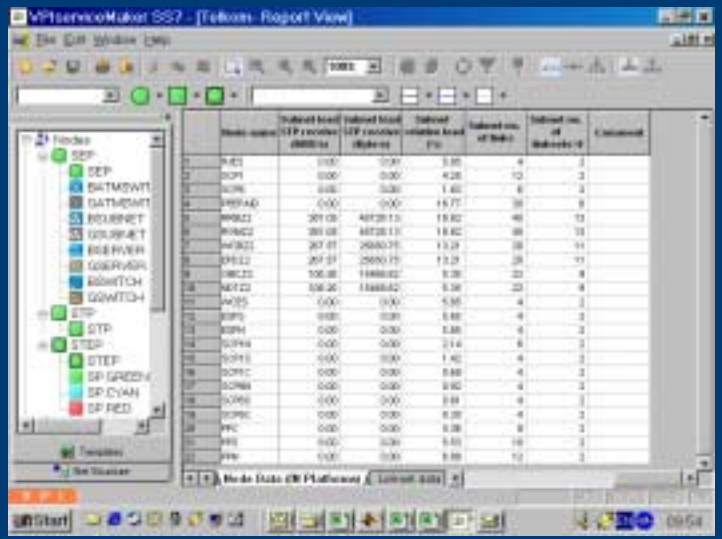


from/to	RABN02	RAOE03	RBB+06	RBI+07	REDV04	RGM+03	RGM+04	RJDF01	RJGM01	F
RABN02	93.52	54.03	21.36	25.26	18.90	20.35	27.80	0.00	0.00	1
RAOE03	54.39	104.53	15.58	19.01	16.92	16.41	18.80	0.00	0.00	1
RBB+06	26.91	19.19	191.62	175.41	31.38	27.95	52.76	0.00	0.00	3
RBI+07	27.83	21.95	157.36	843.00	51.18	37.47	56.81	0.00	0.00	6
REDV04	20.88	21.62	38.70	58.60	191.70	35.66	35.36	0.00	0.00	7
RGM+03	22.87	22.24	32.14	43.30	33.33	52.40	47.96	0.00	0.00	2
RGM+04	31.60	27.04	56.27	58.42	32.79	43.99	86.28	0.00	0.00	3
RJDF01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
RJGM01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
RKMP05	13.81	13.23	38.79	68.27	55.91	23.85	27.75	0.00	0.00	1
RKMP06	12.13	12.92	41.15	84.93	49.12	20.39	27.80	0.00	0.00	1
RSPS06	9.97	8.57	28.59	101.44	13.96	12.85	16.00	0.00	0.00	1
VODACEC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

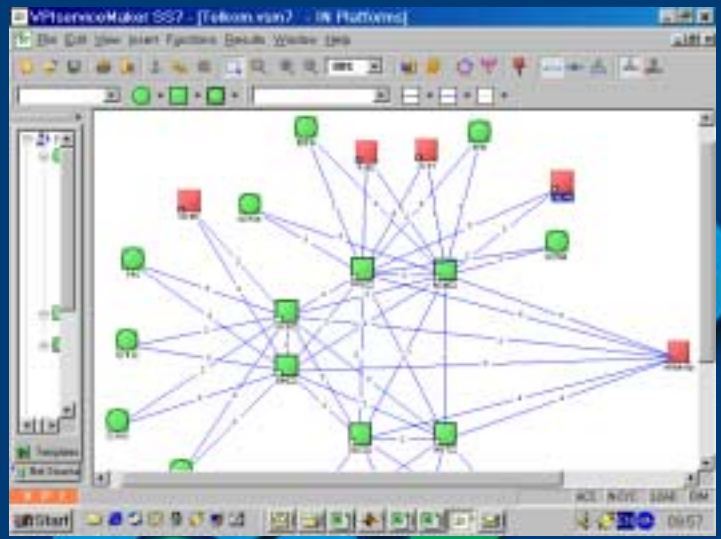
NETWORK DIMENSIONING

Software tools for the design, optimization and evaluation of networks are utilized.

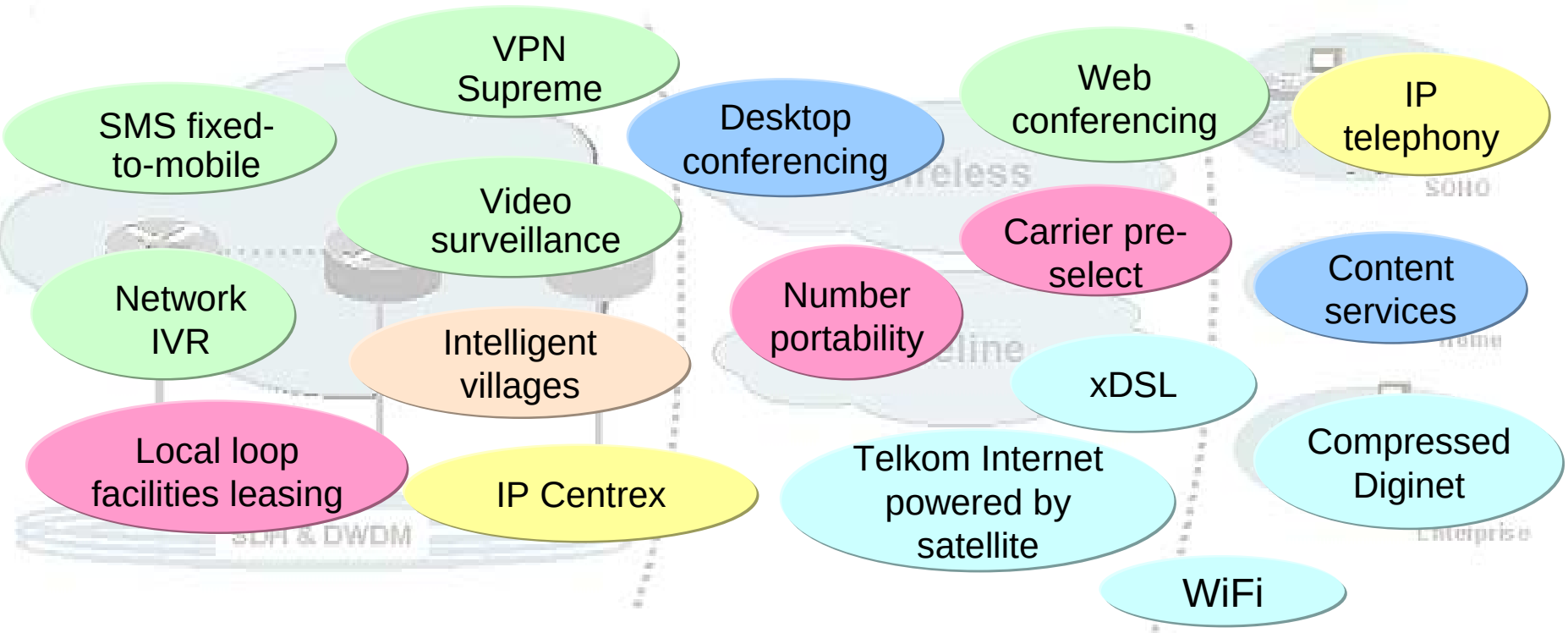
REPORTING



DESIGNING



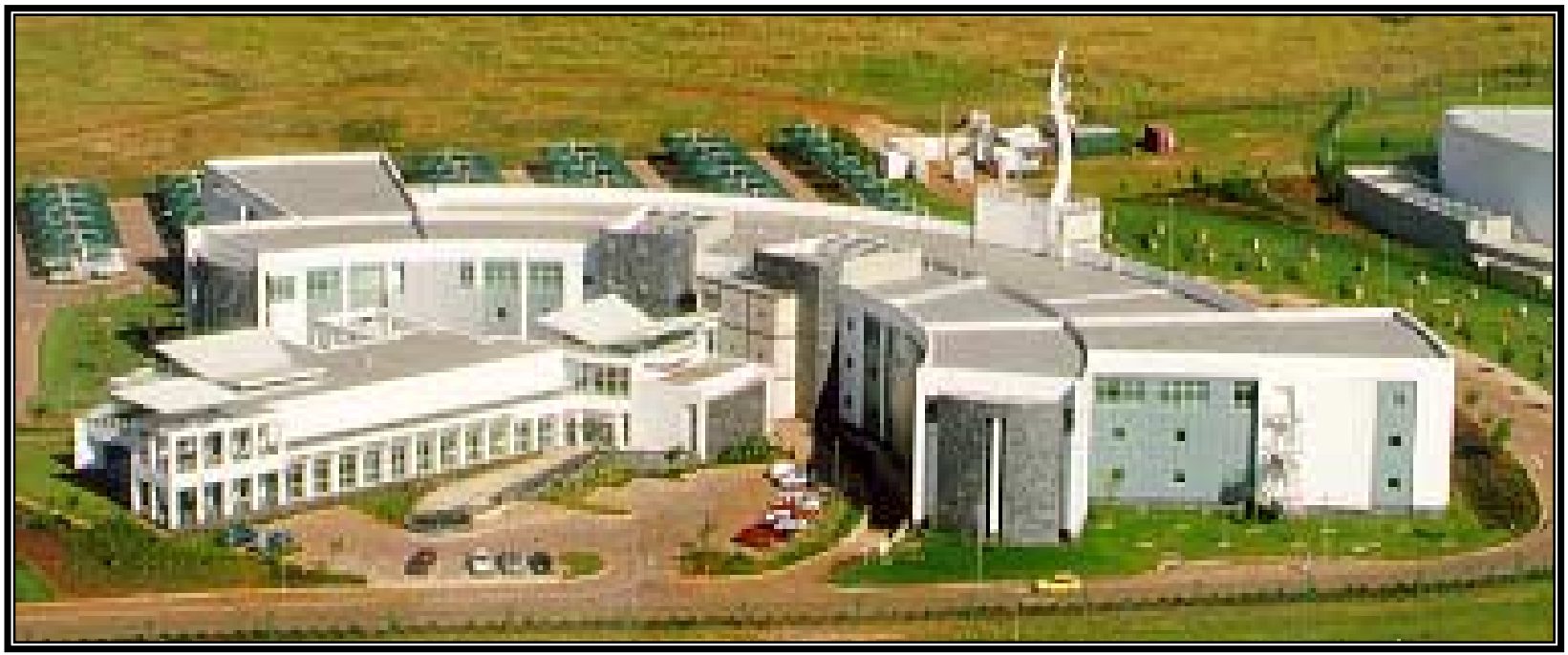
Network capability to deliver enhanced Products and Services – *and many more*



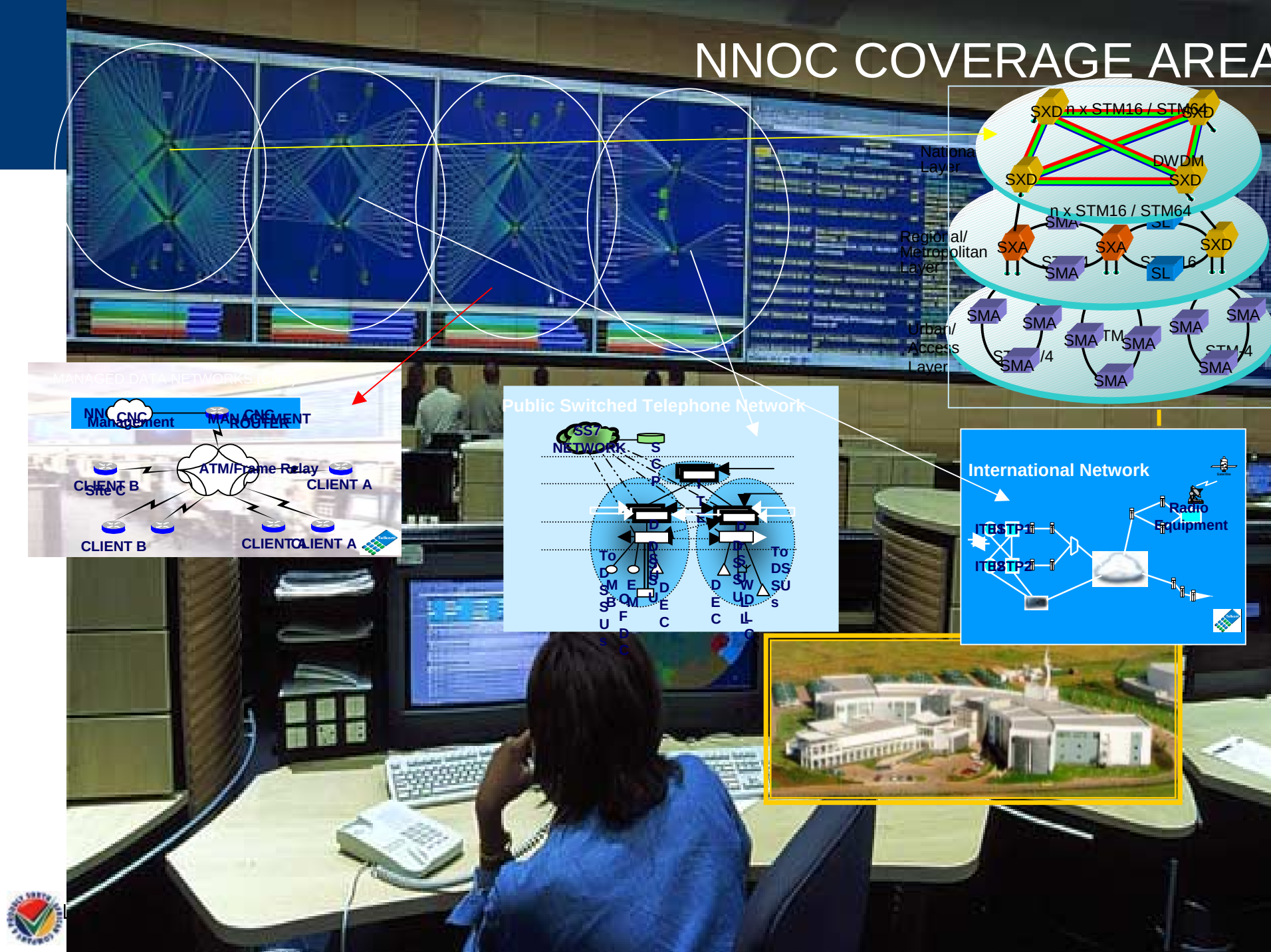
The challenge of Network Management

- Network Manageability
  - All network elements must be manageable
  - Enables optimal network utilisation
  - Enables rapid service activation and restoration
- Managed Data Networks
  - Constant Bit Rate
  - Frame Relay
  - ATM
  - IP
  - Customer Network Care (WAN)
- Functions of the Centre (What we do)
  - Centralised Network Management (All switches, transport elements, traffic WAN)
  - Surveillance 24 x 7 x 365
  - Configuration
  - Workforce management and Traffic management

National Network Operations Center NNOC



NNOC COVERAGE AREA



Special Projects (Completed)

- Elections 1994, 1999, 2004
- World Summit on Sustainable Development
- Rugby World cup
- Cricket World Cup
- Business Against Crime Project
- All Africa Games

Conclusion

- Telkom network infrastructure can handle any major international events.
- The successfully hosting of major international events is proof of this
- Examples include the recent national elections, cricket and rugby world-cups.

Question and Answer Session

Square Kilometre Array (SKA)

Index

- Purpose
- Background
- System Description
- SKA Sites
- Bandwidth Requirements
- Timelines
- Pros/Cons

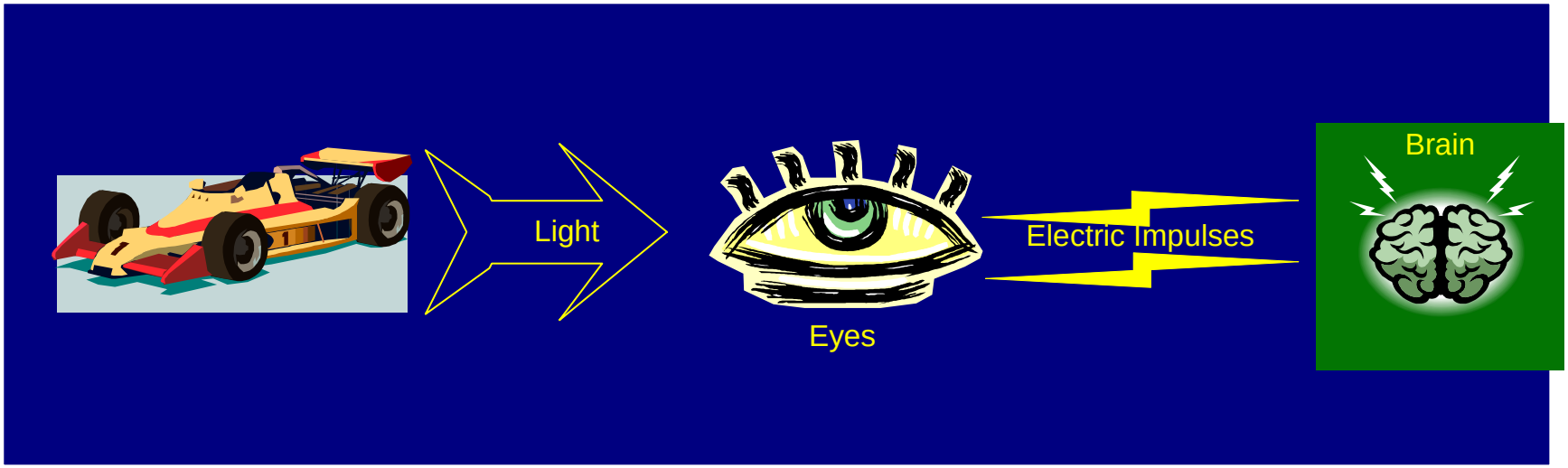
Purpose

- Scientists use the radio telescopes to study various phenomena's including:
  - The Dark ages and the dawn of galaxies
  - Large-scale structure of Universe
  - Galaxy evolution and star formation
  - Evolution of the heavy elements
  - Dark matter
  - The micro-arc second Universe
  - Gamma-ray burst sources
  - Gravitational waves
  - Extra solar planets
  - Search for Extraterrestrial Intelligence

SKA BACKGROUND

- The SKA is a $1 billion international project to create a receiving surface of a million square meters
- This huge surface will be composed of many small antennas, divided into a dense inner core array which becomes more diffuse with increasing radius
- The peripheral antennas could be 1 000 km from the core, or 5 000 km, or even 10 000 km, making the SKA an intercontinental system
- The signals received by each and all of these antennas will be combined to form a single, big, picture
- This will require complex computing and information processing systems. The result will be an instrument capable of probing the secrets of the very early universe

Background (1)

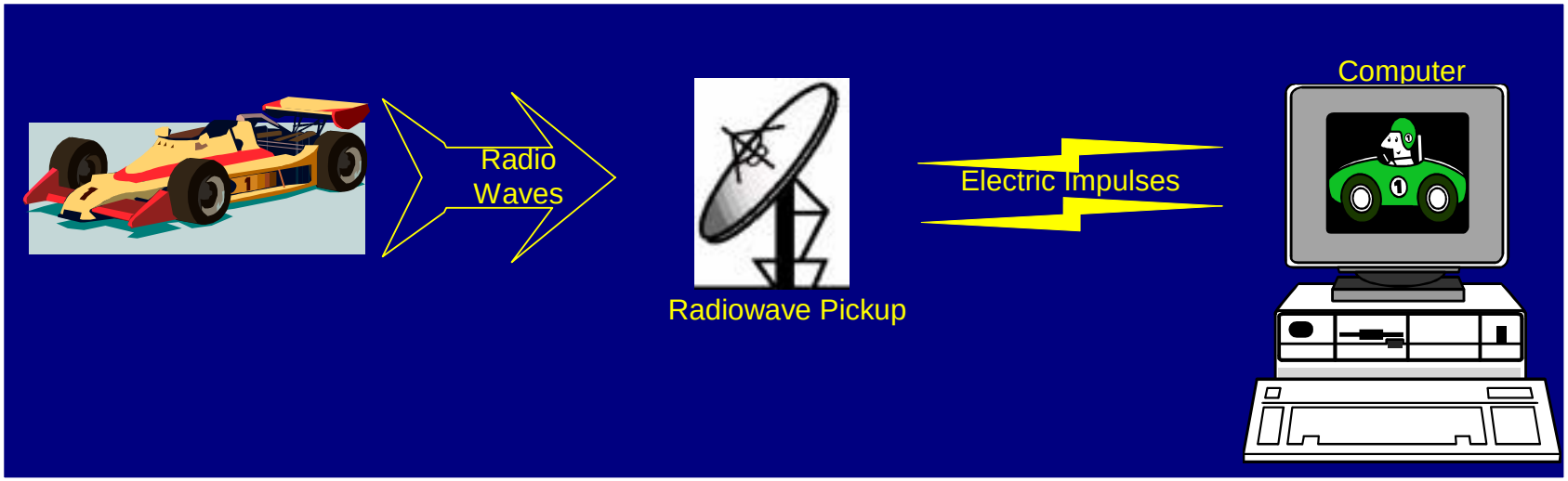


Light > Electric Impulses

Brain interprets Impulses:

- **Recognise Shape**
- **Judge Distance**
- **Judge Speed**

Background (2)

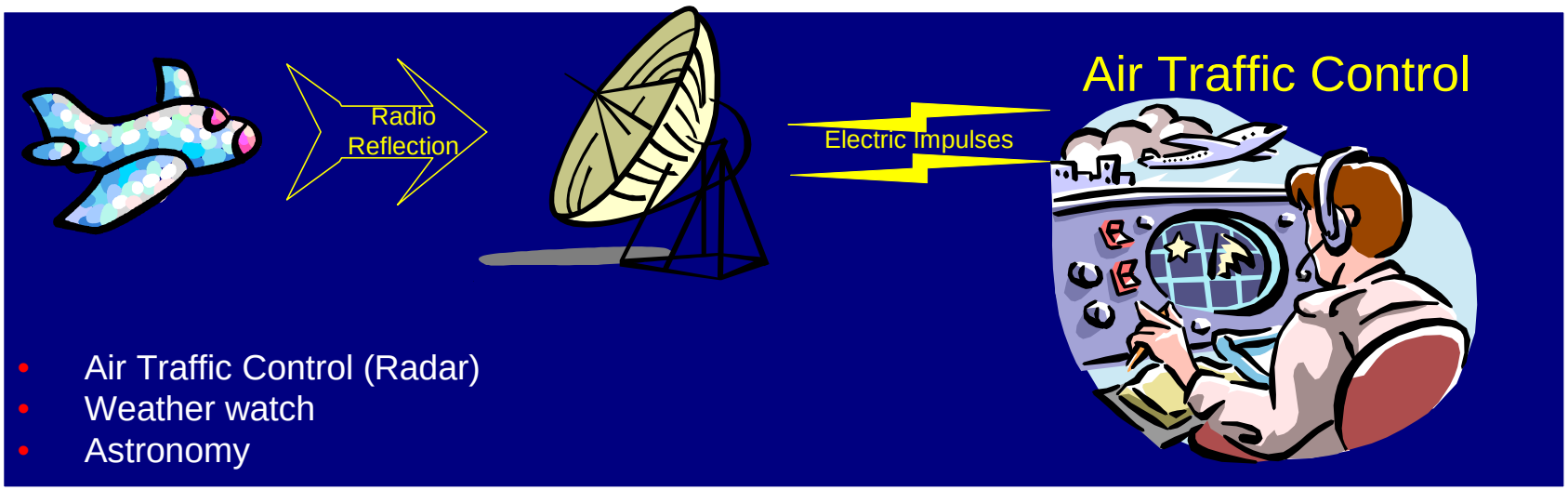


Radio waves > Electric Impulses

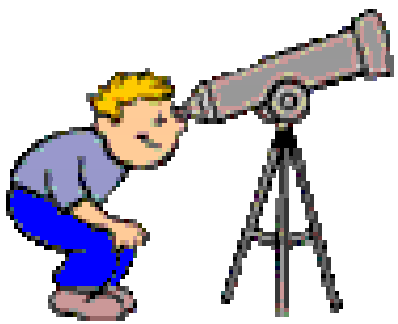
Computer interprets Impulses:

- **Recognise Shape**
- **Judge Distance**
- **Judge Speed**

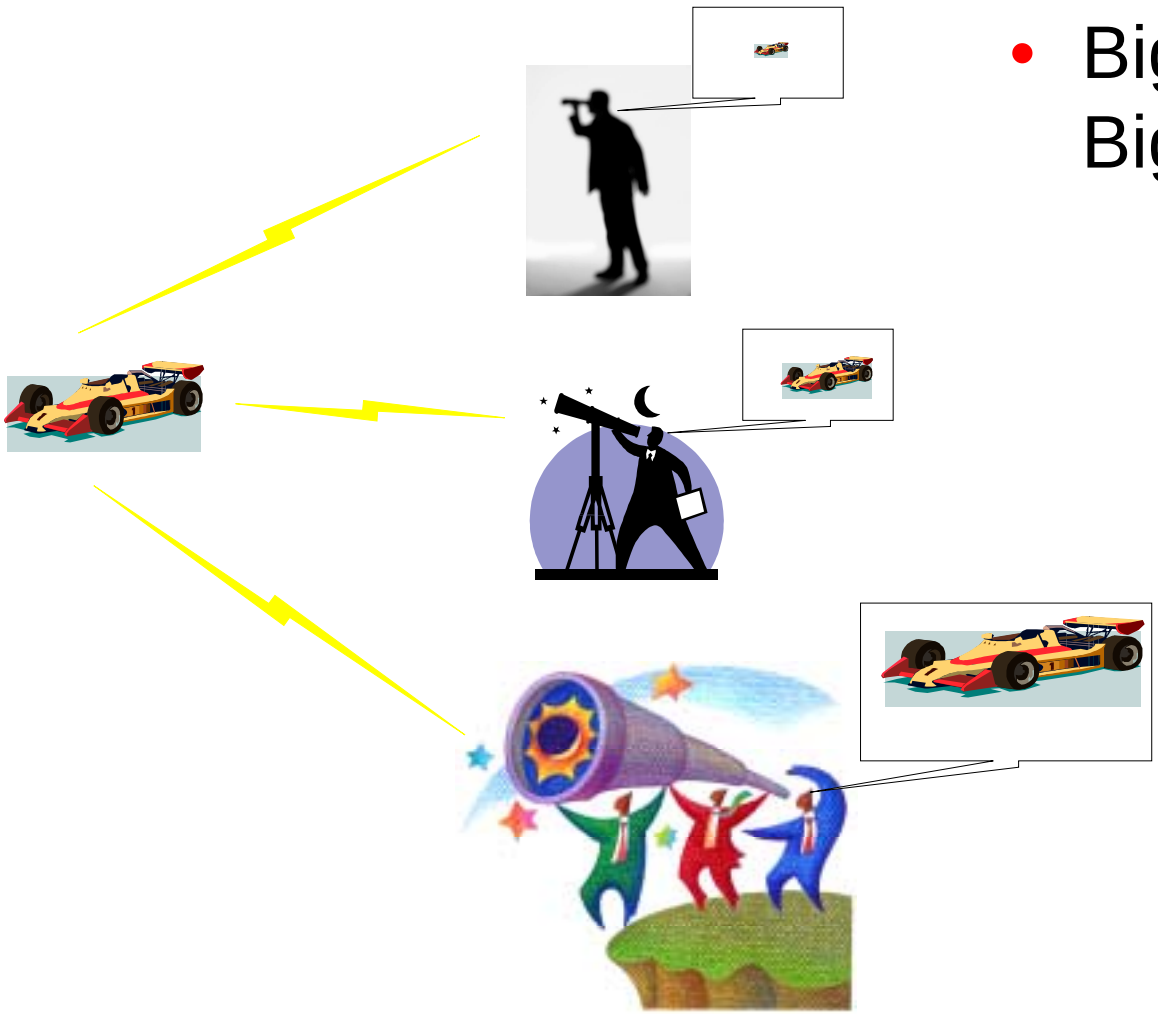
Background (3)



- Air Traffic Control (Radar)
- Weather watch
- Astronomy



Background (4)

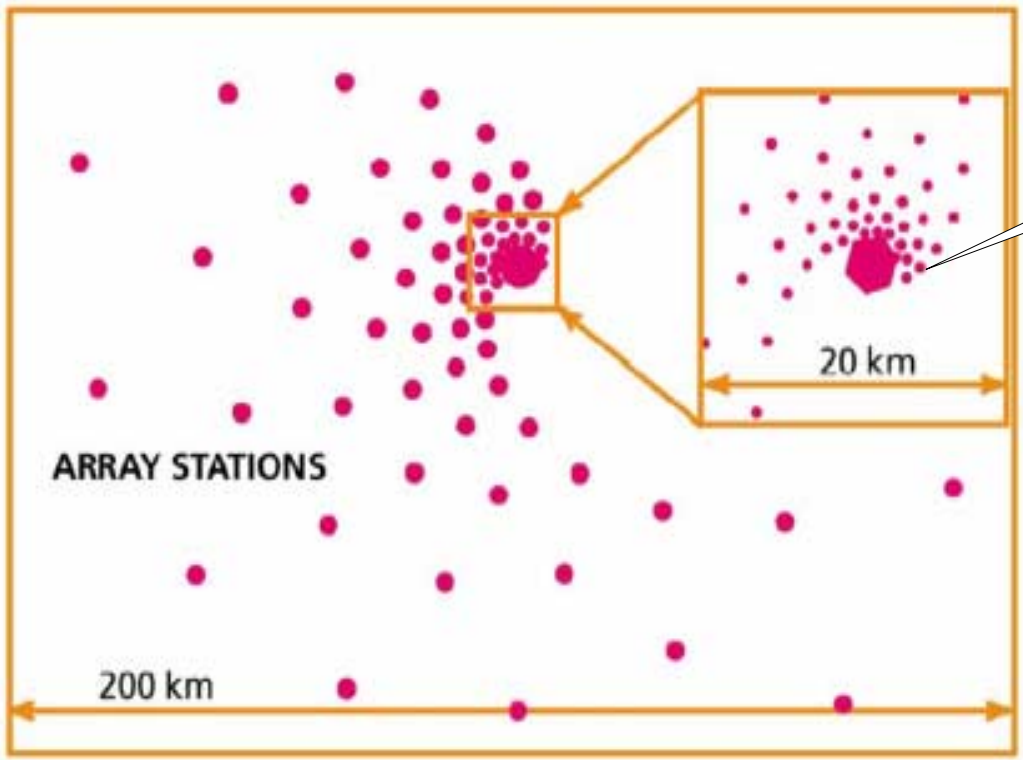


- Bigger lens = Bigger Picture

System Description (1)

1 Large Antenna vs an Array of multiple small antennas

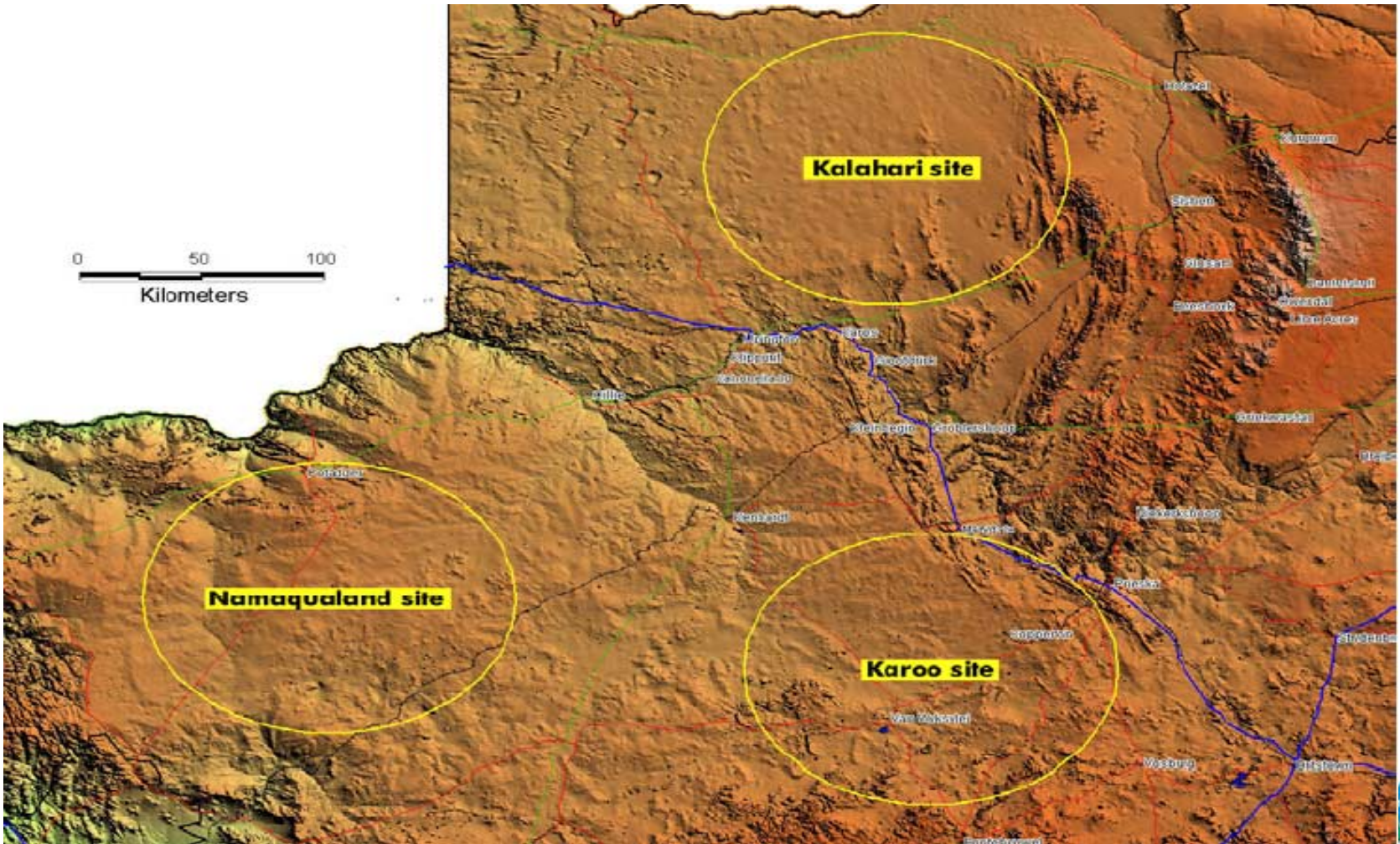
System Description (2)



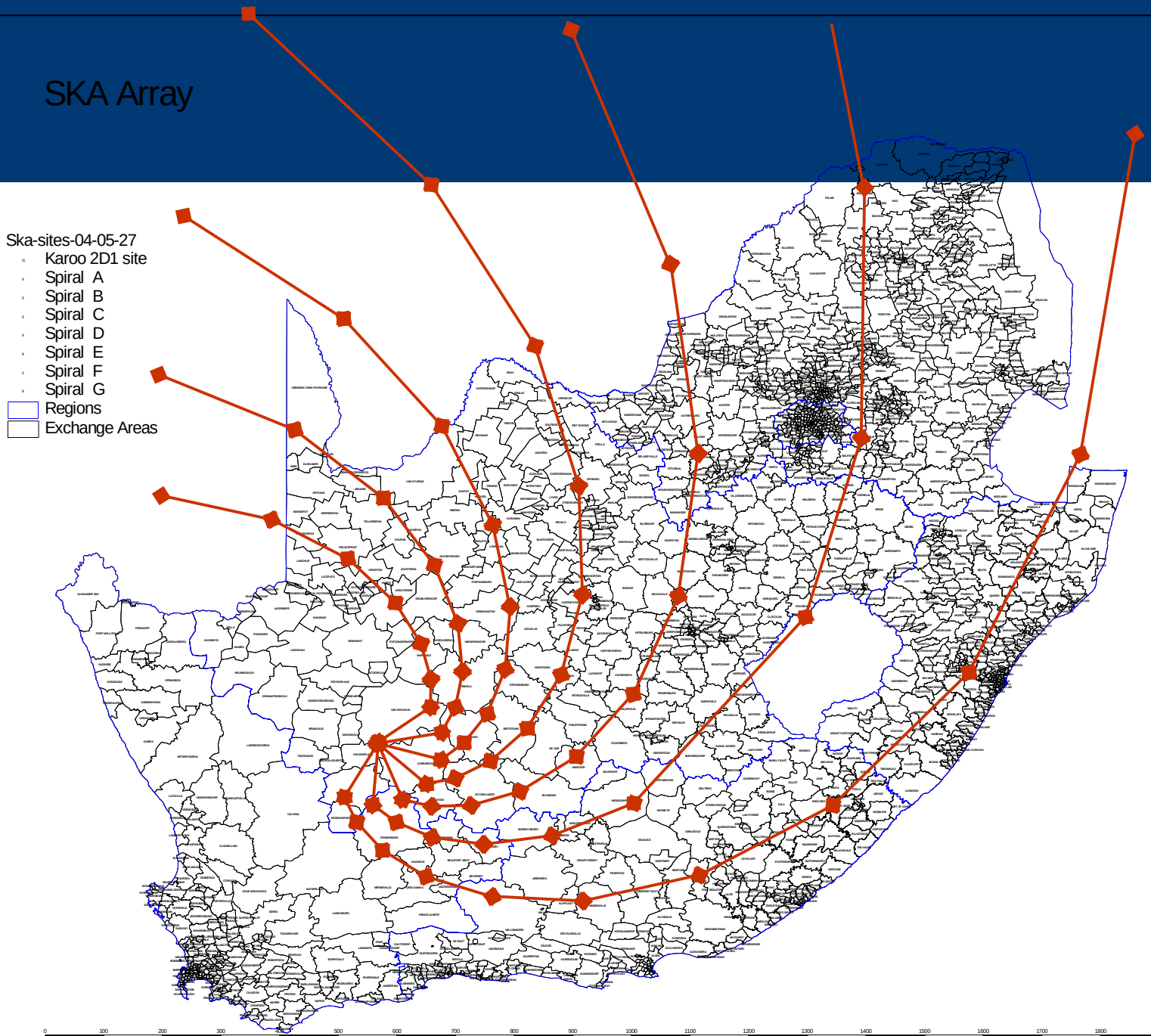
Central Cluster

Central Cluster

System Description (3)



SKA Array


Ska-sites-04-05-27
Karoo 2D1 site
Spiral A
Spiral B
Spiral C
Spiral D
Spiral E
Spiral F
Spiral G
Regions
Exchange Areas
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Kilometers

SKA SITES

- Control centre in Cape Town
- Main/Core Site (correlator) – Karoo 2D1
- Remote Sites
  - South Africa – 51
  - Namibia – 6
  - Botswana – 6
  - Swaziland – 1
  - Mozambique – 1
  - Mauritius – 1
  - Madagascar - 1

SKA Bandwidth and connections

- The capacity requirement are as follows:
- Main site (correlator) and Control site (Cape Town) – 3.8 Tbps
- Main site (correlator) and each Remote site – 152 Gbps
- The control centre in Cape Town needs to be connected to SKA users in other parts of the world

SKA Timelines

- 2000 International SKA Steering Committee formed
- 2002 International SKA Management Plan established
- 2005 International agreement on sites
- 2007 International agreement on technical implementation
- 2009 SKA scientific and technical proposal
- 2012-2020 SKA construction

Pros/Cons

Pros

- Boost SA's status in scientific arena
- $1B budget for SKA project
- Foreigners investing in SA
- Tourist attraction

Cons

- Most of the $1B investment will be spent on R&D and manufacturing (which will be done by mostly international companies)
- Severe limitations on future radio developments (including radar, wireless-telecommunications, Cell phone coverage, Television and radio broadcasting) close to SKA sites and its remote sites (spirals)

Question and Answer Session

Convergence and its impact on SA Telecoms

What is Convergence?

- There is no universal definition of Convergence.

- Convergence can mean:-
  - "Provision of various communication services like text, data,
  - image and video over the existing infrastructure"

  - "Development of new infrastructure for handling multimedia transmission"

  - "Managing of technologically and commercially distinct markets such as Broadcasting, Publishing, Cable TV, Fixed Voice, Cellular Mobile Services and Internet Services"

Types of Convergence ?

- Convergence of Technologies :
  - A common platform to deliver Voice, Data and Video services
- Convergence of Services:
  - Delivery of multiple services to the end users over the same medium/ network
- Regulatory Convergence:
  - Establishing a single Regulatory Authority by blurring the regulatory boundaries for telecommunication, information technology and broadcasting

Drivers of Convergence…1

1. Technology
   - Digitisation of transmission and switching networks
   - Global networks based on packet switching and open standards (IP)
   - Increase in Processing power of Computers
   - Emergence of new applications (ICT) leveraging enhanced software capabilities
   - Evolution of Broadband technologies(xDSL, CMTS, HFC, Broadband wireless- Fixed/ Mobile, Satellite)

2. Market
   - New markets and services such as Multimedia services,Video on demand, Interactive TV, Pay TV,Cable telephony,Unified Messaging services, Internet Telephony etc.
   - Integration of content service providers with access providers
   - Emergence of new Market players based on Potential of ICT

Drivers of Convergence…2

3. Customers
   - Option for new value added services in a modular fashion
   - Cheaper access to communication
   - Single Information Socket (for phone, data, video)

4. Regulation
   - Reduction in cost of regulation by optimum utilisation of regulatory resources
   - Ease of Regulation and Interconnection

Challenges to Convergence…1

- Migration to converged license regime
- Technical Standards
- Fair and non-discriminatory access
- Competition Issues
- Frequency Spectrum
- USO and Digital Divide

Challenges to Convergence…2

1. Migration to converged licensing regime:

   - Maintenance of Level Playing Filed between existing and new players
   - Service based licenses with heterogenous terms and conditions of licenses
   - The existing service provider may need multiple licenses to provide services
   - Licence mapping for all current licenses from old to new licence categories
   - License transitions process
   - Licence structure design and drafting

Challenges to Convergence…3

2. Technical standards:
   - Standards supporting convergence still evolving
   - Availability of multiple standards by different agencies (ITU, IETF, ETSI, ANSI, IEEE etc)
   - Problems of inter-working between various standards
   - Standards for Quality of Service not yet matured
   - Need for Technology Neutral Regulations

Challenges to Convergence…4

3. Fair and non-discriminatory access :

- Complex Regulations governing access to bottleneck facilities
- Transparent , Non- discriminatory &Cost based access.
- Access to contents: Program access regime

Challenges to Convergence…5

4. Competition Issues

- Removal of industry specific regulations and its replacement with general competition law applied equally to all industries.
- Legal framework aiming at promoting competition and prohibiting a range of anti-competitive practices including:
  - Anti-competitive Agreements;
  - Anti-competitive mergers ;and
  - Misuse of market power
- Cross-boarder mergers and cross- media ownership restrictions in certain parts of the media
- Foreclosure of markets by anti- competitive conduct

Challenges to Convergence…6

5. Frequency Spectrum:

   - Possible reallocation of frequency spectrum.
   - Optimum allocation of spectrum to the new licensees.
   - No precedence for allocation of the spectrum in the new regime.
   - De-licensing of bands for certain applications.

Challenges to Convergence…7

6. Universal Service Obligations and bridging the Digital Divide

   - Redefining the scope of Universal Service
   - Identifying contributors for USO
   - Formulation of regulatory policy to bridge the Digital Divide

Licensing under Convergence

- Purpose
  - Authorise market players to do business
  - Prescribe the rights and obligations of market players
- Forms
  - Concessions – contractual arrangement between governments and operators
  - Licences – unilateral act on the part of the licensing authority (preferred method in SA)

Types of Licenses

- Individual licences
- Class licences
- Licence exemptions

Individual licenses

- Often limited competition licences – used where market entry is restricted for policy reasons (eg because a limit has been placed on facilities-based competition) or for technical reasons (eg spectrum scarcity)
- Even in countries where competition is not restricted, individual licences may be used to impose special licence conditions on particular operators to ensure that they behave in a particular manner (eg where an operator has significant market power)
- Usually granted pursuant to some form of comparative selection process
- Preferred licensing method in South Africa

Class licenses

- Issued without any selection process
- Useful tool for simplifying the authorisation regime where there is no limit on the number of market entrants
- Class licences are generally employed where individual licences are not justified, but where there are significant regulatory objectives that can be achieved by establishing general conditions (eg consumer protection requirements
- Mainly used in countries that have fairly deregulated telecom sectors
- Not used in South Africa (yet)

Class licences

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Licence exemptions

- Generally granted in respect of service categories that are fully liberalised
- Useful tool in highly deregulated markets where an activity is technically caught within the definition of activities subject to regulation (eg offering a telecom service to the public), but where no justification exists for imposing any licensing requirements
- General requirements (eg registration with the regulator) tend to be imposed via general regulations and orders
- In South Africa, all telecom service providers are required to hold a licence, but ICASA is empowered to grant exemptions in respect certain service categories

Methods for choosing new entrants

- Competitive selection
  - Based on a single objective quantitative criterion
  - Usually used to allocate spectrum, not for service licences
  - Transparent, but can be costly

- Comparative selection
  - Based on a quasi-subjective assessment of one or more quantitative selection criteria
  - Not transparent – prone to accusations of bias and corruption from losing bidders
  - Currently the preferred method in SA for limited competition licences

Licensing trends

- General shift away from individual / comparative selection processes to class-based licensing systems for facilities-based competition (EU)
- Removal of all restrictions on the number of service-based and facilities-based competitors (most developed markets)
- Adoption of class licensing regime / granting of licence exemptions for service providers and content providers (Australia / Far East)

Convergence and licensing

- Convergence is usually coupled with deregulation and liberalisation of the licensing regime
- Usually, more stringent licensing requirements apply to network services / facilities
- Application services / content services are often subject to comparatively light touch regulation, and sometimes exempted from the requirement to hold a licence altogether

Licensing in Malaysia (1)

- Four-tiered regulatory regime for telecoms
  - Network facilities providers – owners of communications networks
  - Network service providers – provide the basic connectivity and bandwidth. Network service providers are typically also the owners of network facilities
  - Applications service providers – provide particular functions to end users (such as voice services, data services, content-services, and e-commerce services)
  - Content applications service providers – are a special subset of application services. Content services include traditional broadcast services and new services such as online publishing and information services

Licensing in Malaysia (2)

Category	Individual licence	Class licence	Exempt
Network facility providers	Earth stations, fixed links & cables, public payphone facilities, radiocommunications transmitters and links, satellites, submarine cables, switching centres	Niche or limited purpose network facilities	Broadcasting & production studios, incidental network facilities, private network facilities
Network service providers	Bandwidth services, broadcasting distribution services, cellular mobile services, access applications services	Niche customer access services, niche connection services	Incidental network services, LAN services, private network services, routers, internetworking
Applications service providers	PSTN services, public cellular services, IP telephony, public payphone services, public switched data services	Audiotext hosting services,provided on an opt-in basis, directory services, internet access services, messaging services	Electronic transaction services, interactive transaction services, web hosting and client servers
Content applications service providers	Satellite broadcasting subscription services, broadcasting, terrestrial free to air TV, terrestrial radio broadcasting	Not issued	Internet content applications services

Licensing in Australia

- Open telecommunications market
- Three-tiered regulatory regime for telecoms:
  - Carrier licences – subject to individual licensing, but no restriction on the number of facilities-based competitors
  - Carrier service providers – exempt from the requirement to be licensed
  - Content service providers – exempt from the requirement to be licensed

Comparison: Australia / Malaysia

- Australia applies uniform licensing rules to each tier (networking / services / content)
  - Less intensive and complex to administer
  - Only appropriate in a highly deregulated market (?)
- Malaysia applies different licensing rules to service categories within each tier, depending on their economic importance
  - More complex and intensive to administer
  - More appropriate in an environment of managed liberalisation such as South Africa (?)

Licensing regime in SA (1)

- Telecommunications
  - The Telecommunications Act does not take a tiered approach to licensing
  - Facilities and application services are both treated as telecom services
  - The Telecommunications Act does not deal with the transmission of content over telecom networks – this is self regulated between network operators and service providers
- Broadcasting
  - The broadcasting legislation distinguishes between broadcasting (content), signal distribution and multi-channel distribution – there is some attempt to tier the licensing regime

Licensing regime in SA (2)

- Broadcasting and telecoms are subject to different licensing requirements in SA
- In general, the licensing regime for broadcasting is far less restrictive and is subject to less executive interference than in the case of telecoms
- Eg: facilities-provisioning in the telecoms environment is restricted, whereas in broadcasting, anyone may self-provide, provided that a signal distribution licence is obtained
- Will the harmonisation of licensing regimes result in telecoms being deregulated to the broadcasting standard?

Convergence in South Africa

Telkom's position

Telkom's Key Principles on Convergence

- Managed liberalisation
- Clear Regulatory Environment
- Effective & Independent Regulator
- Self-regulation & Co-regulation
- Technology-neutral
- Fair & Balanced outcomes
- Consultative & Public process

Convergence Colloquium

- Telkom welcome convergence and has participated fully at the industry Colloquium on Convergence
- Draft 1 of the Convergence Bill was released to the industry for comment on 25 July 2003
- Thereafter industry was involved in an extensive process of effectively redrafting the Bill
  - The industry wants one piece of legislation that will replace the existing legislation governing ICASA and the telecoms and broadcasting industries – the DoC does not want to repeal the underlying legislation
- The redrafted Bill raised more questions than answers – effectively taking it back to the drawing board for further redrafting
- Redrafted Bill expected to be tabled in Parliament towards the end of 2004

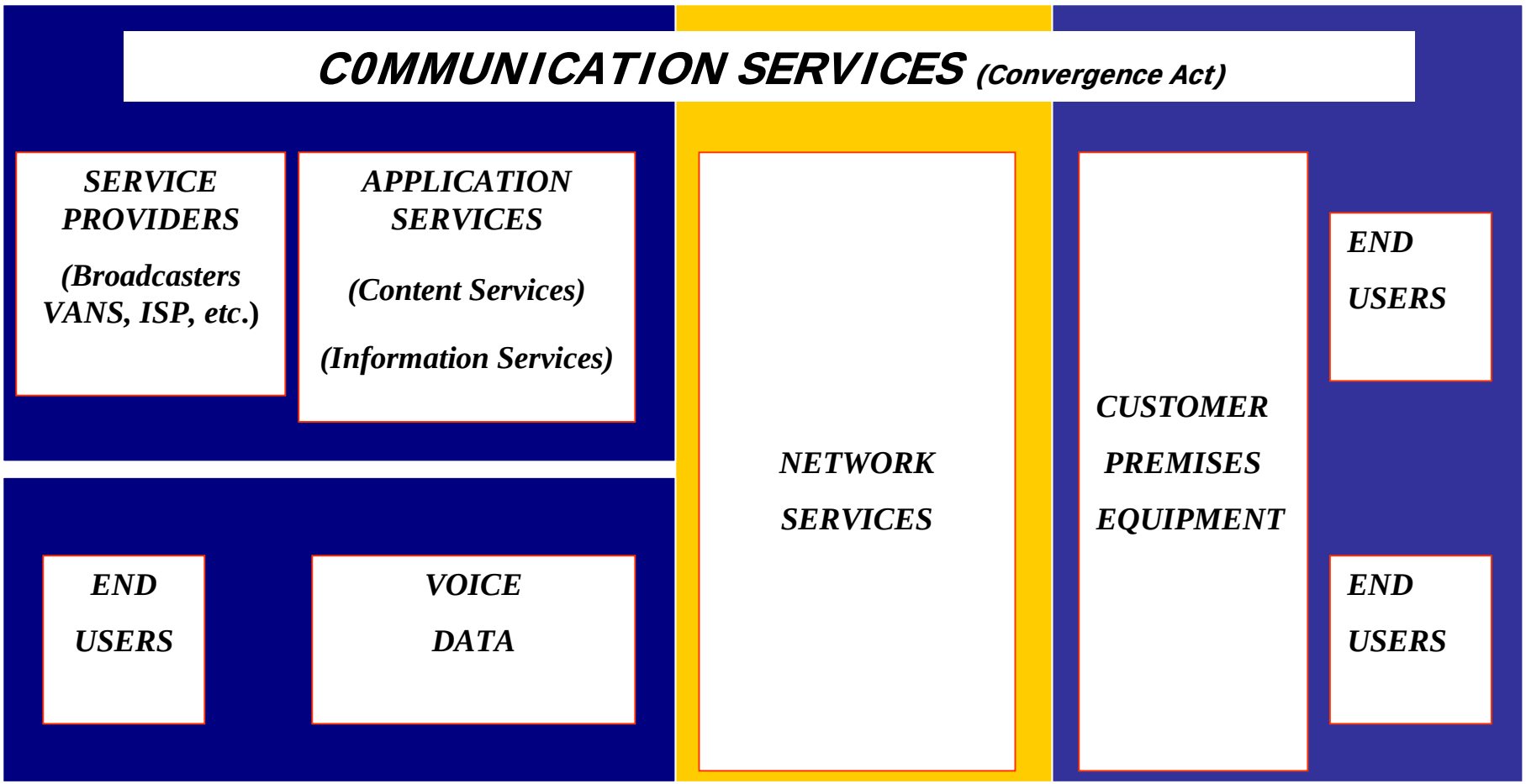
Convergence Colloquium

- Convergence regulation in most countries post-dates the liberalisation of the market
- What is unusual about South Africa is that convergence regulation is taking place in a context of managed liberalisation – the market has not yet been fully opened up to competition
- Real purpose of the Bill is to pave the way for market liberalisation

Convergence Mapping: Pre-Convergence

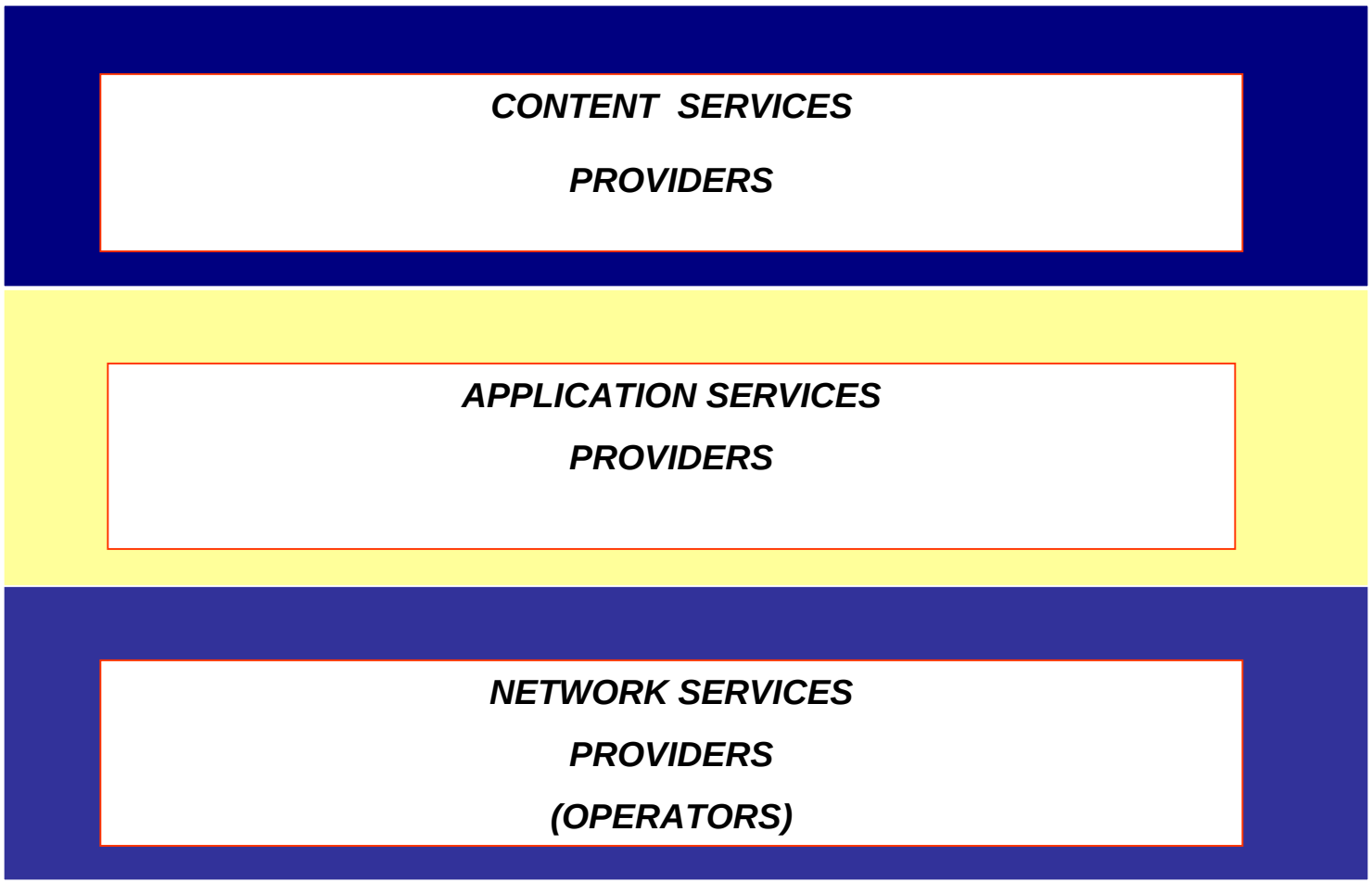
ORIGINATION		TRANSPORT	DESTINATION	
BROADCASTING *(Broadcasting Act, IBA Act, ICASA Act, Sentech Act)*				
Broadcasters	*Broadcast Content*	*Signal Distribution (Sentech, Orbicom, etc.)*	*TV & Radio Sets*	*End Users*
ENHANCED DATA SERVICES *(Telecommunications Act, ECT Act , ICASA Act)*				
VANS, ISP, etc.	*Information Services*	*Telecommunication Networks (Telkom, SNO, Sentech, USALs)*	*Computers & Data Terminals*	*End Users*
VOICE/DATA CONVEYANCE SERVICES *(Telecommunications Act, ICASA Act)*				
End Users	*Voice Data*	*Fixed Networks (Telkom, SNO, USALs)*	*Voice/Data Terminals*	*End Users*
		Mobile Networks (MCOs, USALs)		

Convergence Mapping: Post Convergence



Convergence Mapping: Licencing

C0MMUNICATION SERVICES ***(Convergence Act)***



The Bill so far… (1)

- Licensing regime
  - 3 tier horizontal licensing regime
    - Network services
    - Application services
    - Content services
  - 3 types of licensing methods
    - Individual
    - Class
    - exemptions

The Bill so far… (2)

- Transitional provisions
  - All existing licences to remain valid for their full duration
  - ICASA must convert current vertical licences to horizontal licences with the agreement of each licensee
  - All existing network operators to be confined to their vertical markets for 2 years, after which they may compete across each others' platforms (affects Cell C, MTN, Orbicom, Sentech, SNO, Telkom & Vodacom)

The Bill so far… (3)

- Clarification of the roles of the Minister and the regulator
  - Gives ICASA full responsibility for regulatory processes
  - Relegates the role of the Minister to policy-making only
  - Main impact: gives ICASA independence in relation to licensing and regulation-making

The Bill so far… (4)

- Competition issues
  - The Bill reinforces ICASA's concurrent jurisdiction with the Competition Commission over general competition matters
  - ICASA retains exclusive jurisdiction over sector specific competition matters (such as access, interconnection, facilities leasing, number portability, carrier pre-selection, etc)

Concluding remarks

- Technology changes quickly, regulations change slowly
- Legacy regulation is not relevant in the convergence era
- Prioritisation of regulatory challenges for optimum utilisation of regulatory resources
- Drawing the roadmap for implementation of convergence
- Need for efficient and timely dispute resolution mechanisms for converged licensing regime
- Capacity and expertise building in the regulatory bodies to meet the challenges of convergence

Question and Answer Session