

# **Information and Communications Technology**

Prof Walter Green

# Outline of Talk

- Understanding Need and Growth
- Practical Examples
- Future Network
- Regional Objectives

# Benchmarks

## Growth Patterns from

- 1985 [History],
- 2005 [Today] and
- expected growth to 2025

## covering the Key Technologies in

- Computers
- Fixed Links and
- Radios

# Computers

The Basic Building Block of all Information and Communications Services is the Transistor.

We combine Transistors to build the Services we need consisting of:

- Computers
- Networks
- Radios

# Computers

	Transistor (Peak Switching)	Architecture	PC Computer
1985	50 Mbit/s	Limited Arithmetic and Comparison	5 MHz
2005	545 Gbit/s	Limited Parallel or Array Processing	3.2 GHz
2025	500 Tbit/s	Multi Threaded Parallel Arrays	5 THz

# Fixed Links

The Key measures of all Fixed Links are the

**Backhaul** or Carrier Links to local areas and

**Data Speeds** purchased by the community

# Fixed Links

	Carrier Data Rate	Community Data Rate	Bunbury Data Rate
1985	10 Mbit/s	300 bit/s	64 Mbit/s
2005	10 Gbit/s	1.6 Mbit/s	2.5 Gbit/s
2025	10 Tbit/s	800 Mbit/s	10 Tbit/s

# Mobile Links

Mobile Connections are based on two factors

- User Ground Speed
- Data Rate

A useful Indicator is the Data/Speed Rate based on the Product of the User Speed and Data Rate (Law of Constant Misery)

- High User Speed – Low Data Rate
- Low User Speed – High Data Rate



# Mobile Links

	Data Rate	Speed	Data/Speed
1985	50 bit/s	30 km/h	1500
2005	512 kbit/s	60 km/h	$31 \times 10^6$
2006	2.5 Gbit/s	20 km/h (Peak)	$50 \times 10^{12}$
2025	5 Gbit/s	160 km/h	$800 \times 10^{12}$

# Practical Examples

**1. Broadband Price and Speeds**

**2. Transistor Speeds**

**3. TeleHealth Data Needs**

# Transistor Speeds

	Peak Speed	Computer	PC
Nov 2006	545 Gbit/s	55 GHz	3.1 GHz
Jan 2007	845 Gbit/s	85 GHz	4.2 GHz

The IBM and Intel Hafnium Transistor can produce a 5 GHz PC

Quantum Computer - ?? Tbit/s

# Transistor Speeds

These new transistors will have an immediate impact on:

- Networks and LAN Speeds
- Imaging (especially Medical)
- Data Mining

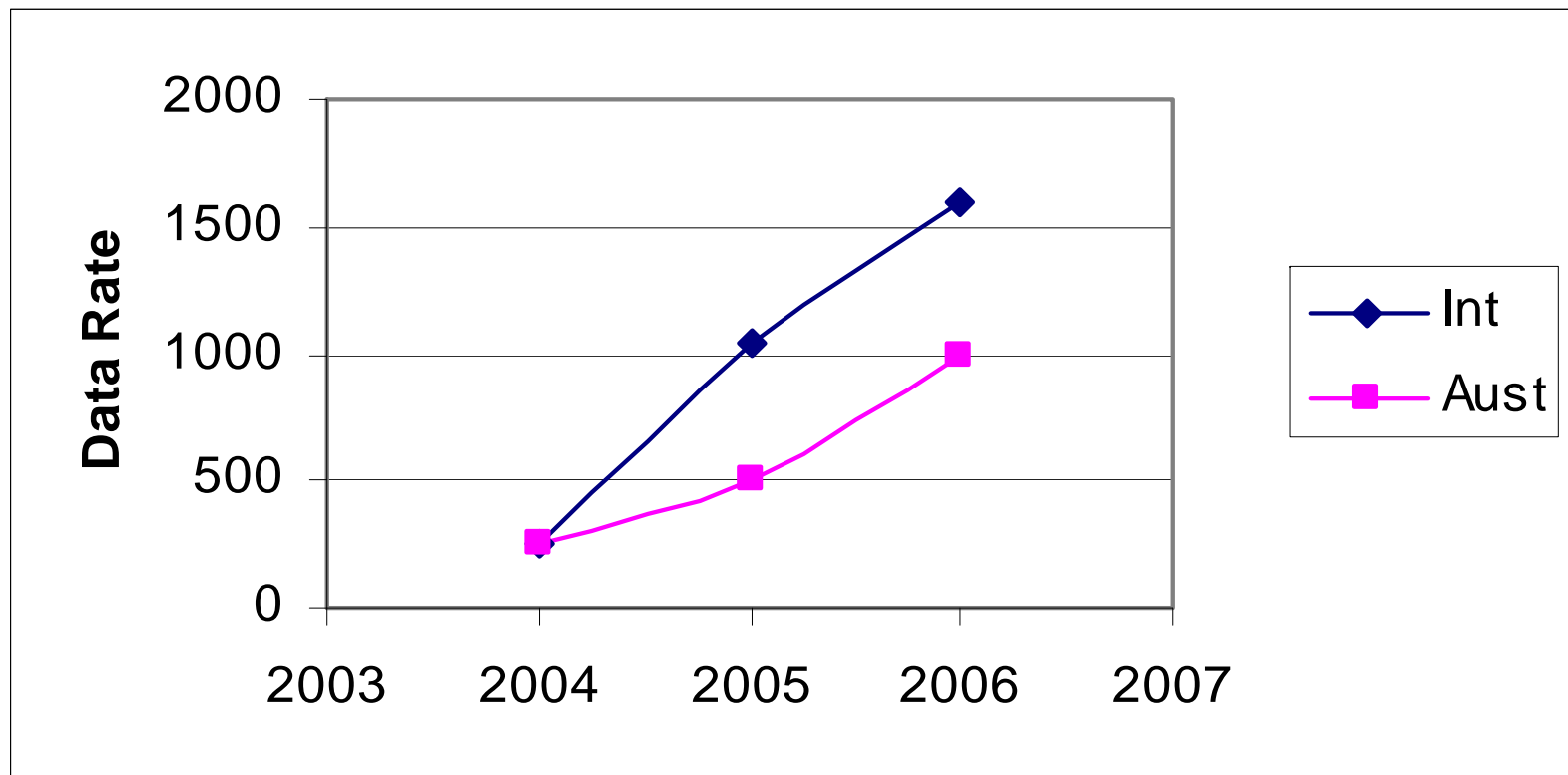
# TeleHealth

Study by Communications Experts  
Group in 1999 and updated for 2006

	1999	2006
Doctors' Surgery	2 Mbit/s	10 Mbit/s
Regional Hospital	100 Mbit/s	1 Gbit/s
Major Hospital	622 Mbit/s	5 Gbit/s

# Broadband Speed

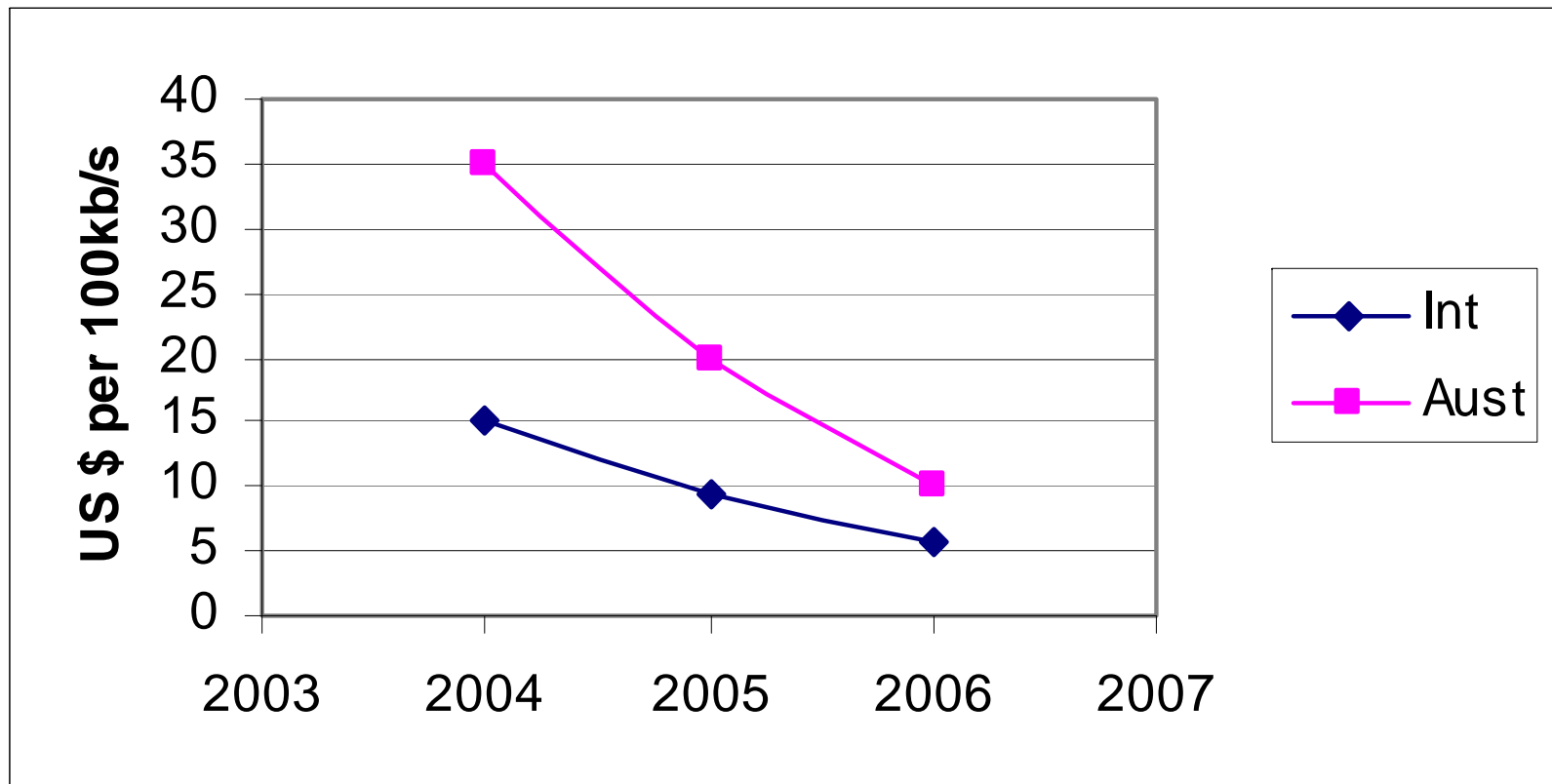
Based on Median Values for 133 Countries that had Broadband in 2004



Source ITU Internet Reports 2006 – Digital Life

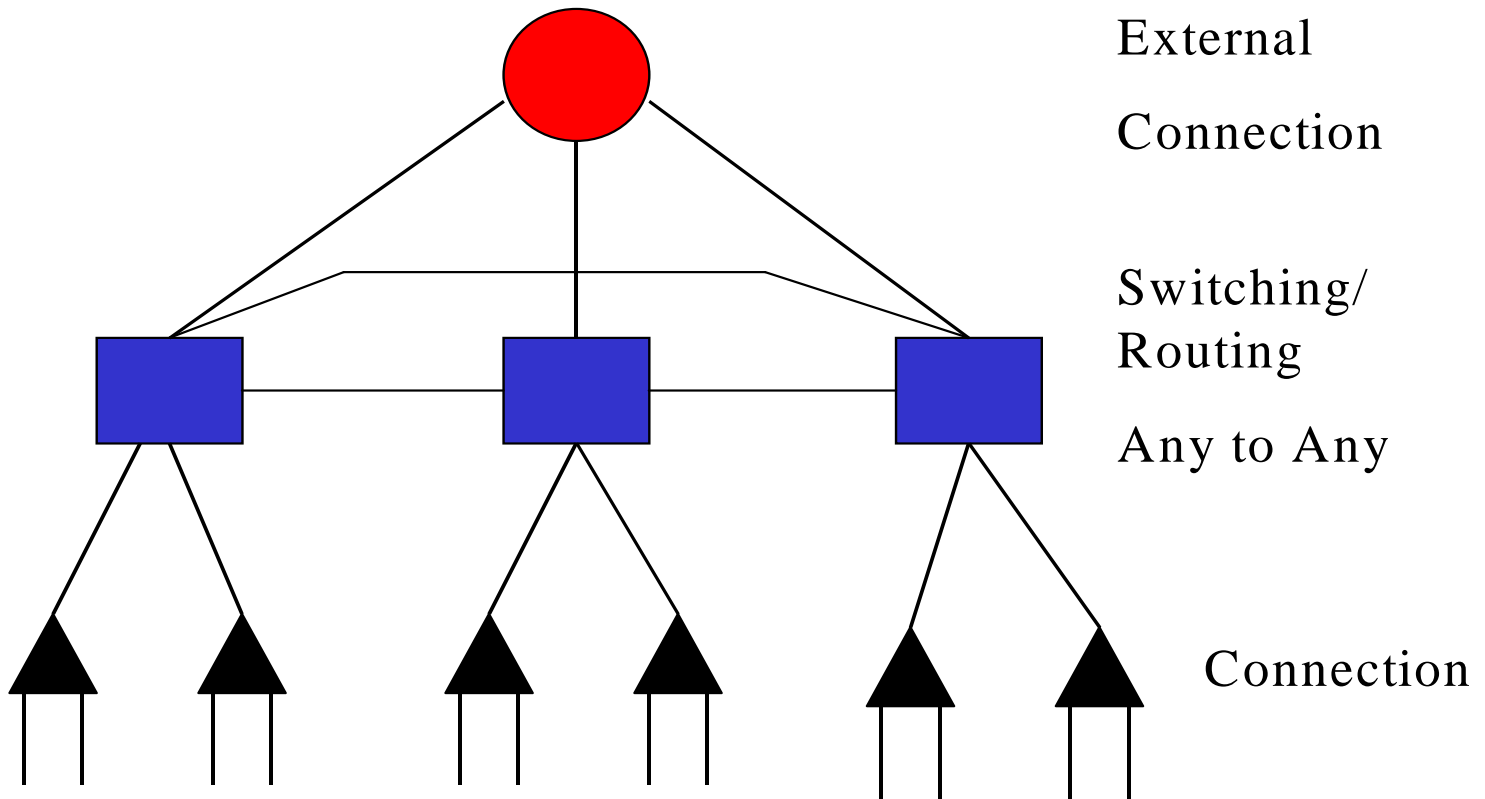
# Broadband Price

Based on US \$ per 100 kbit/s



Source ITU Internet Reports 2006 – Digital Life

# Network Architecture





# Future Network

## Major Nodes for South West Region

Bunbury

Albany

Margaret River

## Minor Nodes

Suburbs

Smaller Towns

# Data Rates

- Backhaul Links – Terabit Fibre
- Mobile – 4 G plus (802.16 variants)
- Home – Shared Fibre Networks

# Regional Objectives

Conduit along Roads suitable for  
48 core Fibre Cables

50 m Towers not more than 50 km apart

New Housing

Mandate Conduit Access (\$1200.00 per  
plot)

# Regional Objectives

## Existing Suburbs

- Conduit under Footpaths
- Conduit across Roads when road upgraded

Support Square Kilometre Array Project ”

# Conclusions

- Network Demands are realistic based on current devices and applications
- Create an Alternative Backhaul Network  
A good example is Broadband Net
- Plan and Reserve land for Telecomms *Now*

# Questions

# Network Architecture

