

Spectrum Management



Case Study: *Australia*



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ACA structure

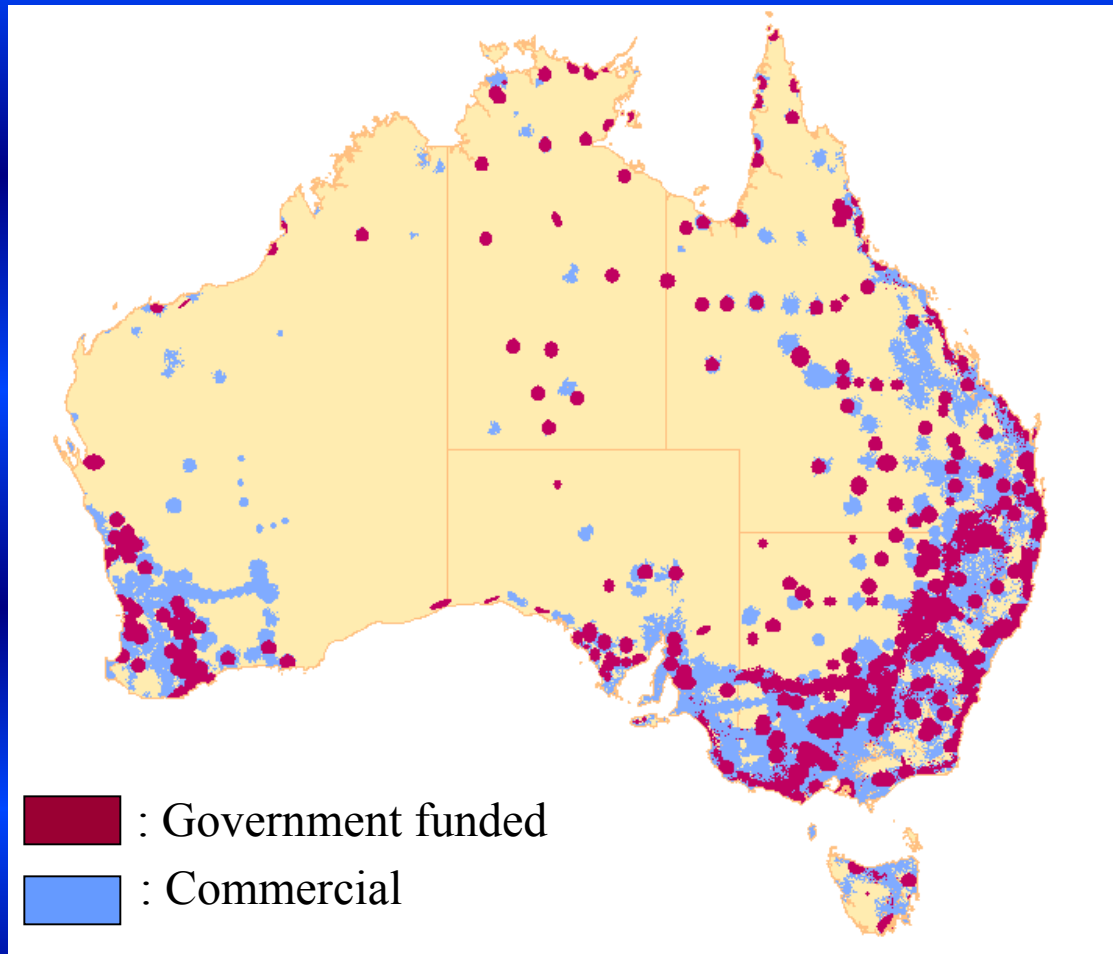
Spectrum management review process

Wireless broadband

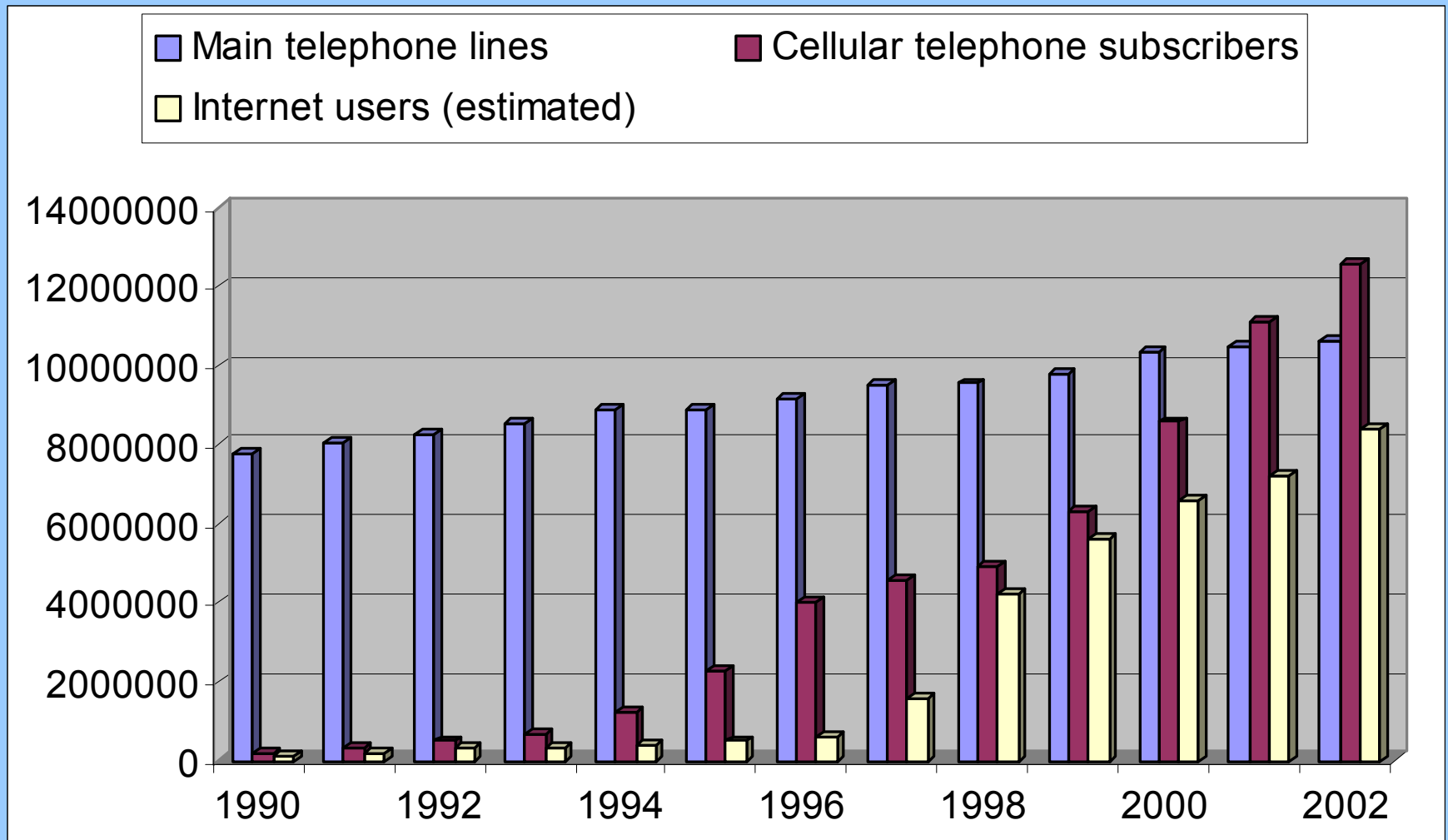
Interviews in Australia



Mobile phone coverage



Evolution of fixed, mobile and Internet users in Australia



Timetable

Year	Action	Organisation
1905	<i>Wireless Telegraph Act 1905</i>	Postmaster-General's Dept (PMG)
1946	International telecommunications	Overseas Telecomm. Commission (OTC)
1975	New State-owned operator	Telecom Australia
1981	Satellite operator	AUSSAT
1989	Competition in value-added services Telecommunications regulator	AUSTEL
1991	Duopoly	Telstra (Telecom + OTC) & Optus (ex-AUSSAT)
1992	<i>Radiocommunications Act 1992</i> <i>Broadcasting Act 1992</i>	ABA
1993	Independent spectrum manager	Spectrum Management Agency (SMA)
1994	1 st spectrum auction	
1997	<i>ACA Act 1997</i>	ACA (SMA + AUSTEL)



Radiocommunications Act 1992

Early 1990's REFORM

- > **market-based** system;
- > more **efficient** administrative system;
- > spectrum management **agency**



Radiocommunications Act 1992

Main objective: Maximise, by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using the radiofrequency spectrum.



√ Spectrum Management Agency (SMA) → ACA

√ New category of licences

√ Auctions

√ More flexible regime for standards conformity

1997 amendment

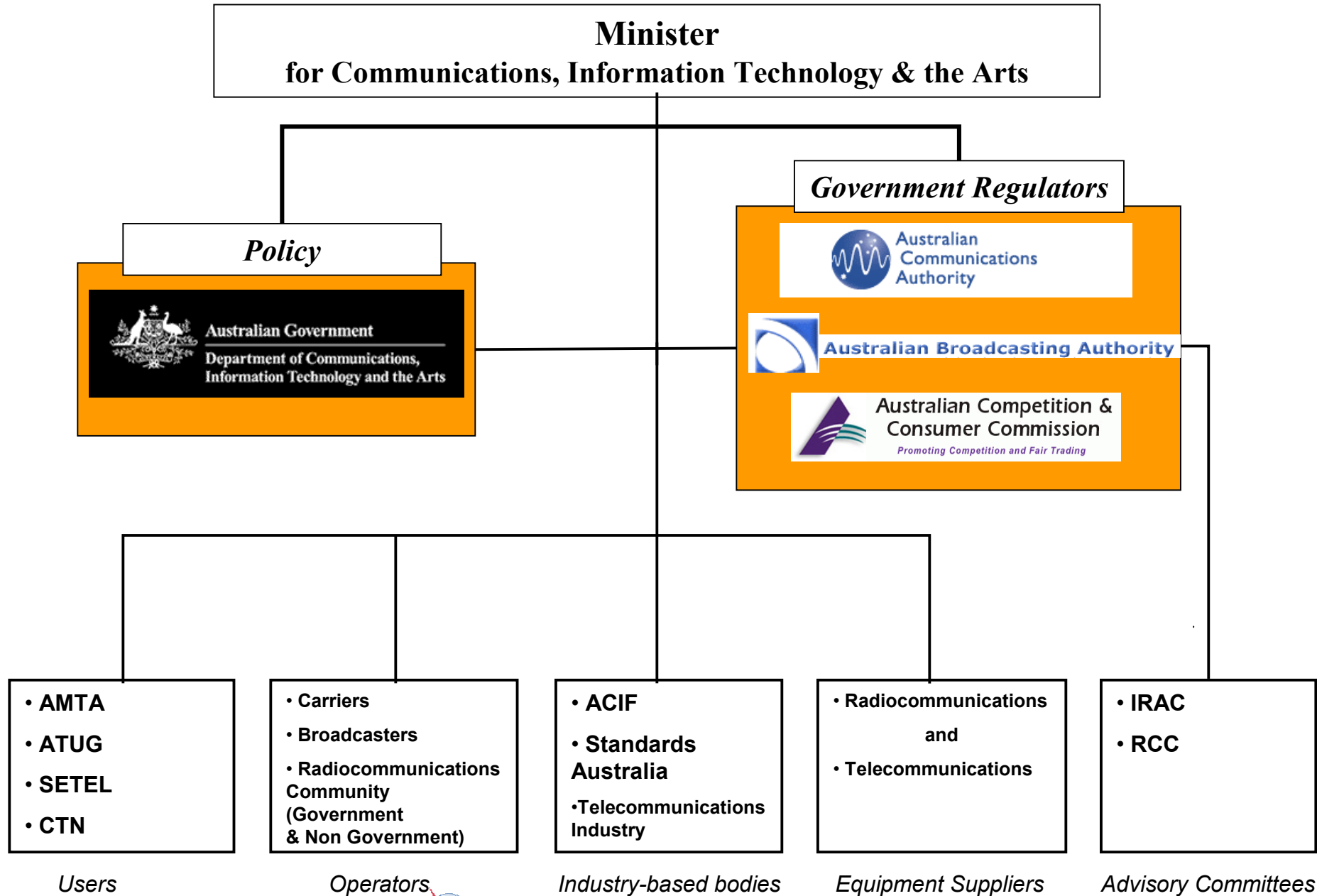
√ Spectrum re-allocation procedures

√ Competition limits to auction

√ Health & safety EMR standards



Radiocommunications and Broadcasting Regulatory Environment



Spectrum Management in Australia

Most are happy

“Australia was one of the first countries to recognise the potential for **market-based reforms**, using property rights, to increase efficiency in spectrum use. The *Radiocommunication Act 1992* went beyond the traditional, equipment-specific licensing approach to introduce class licences and technology-neutral spectrum licences to meet the needs of **new technologies**.”

The Productivity Commission Inquiry Report, July 2002

Spectrum Management in Australia

Few unhappy

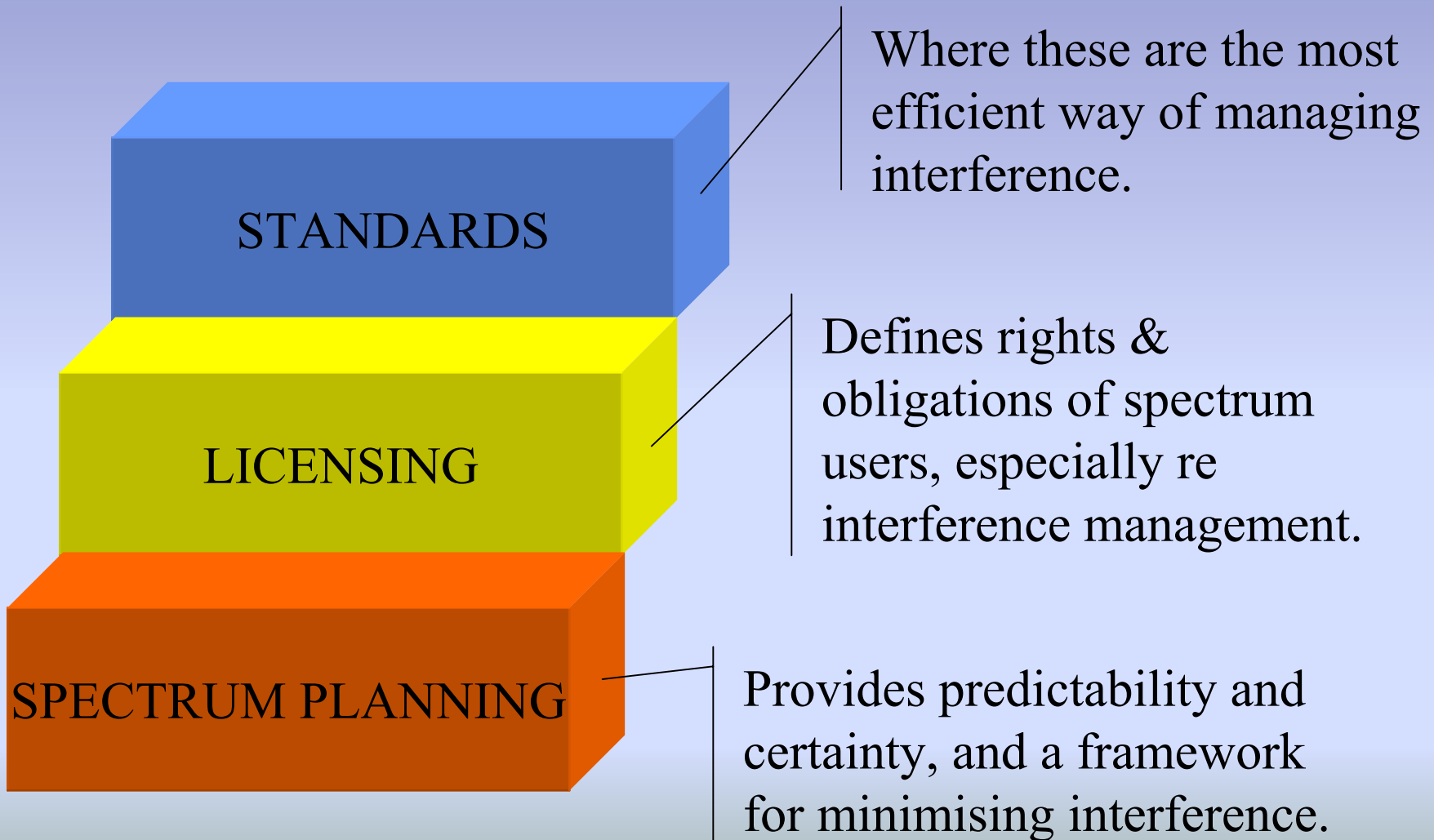
*“We manage our radio spectrum for **political reasons** rather than technical, giving special privileges to specific companies and industry sectors. There's a dead-hand on all spectrum allocations in this country that serves to **kill competition**, and reduces the viability of electronics manufacture and design.*

Spectrum scarcity is artificially manufactured in Australia by specifying limits designed for congested cities, and based on old technologies. The restricted range of spectrum is then auctioning in large blocks as a 'scarce resource' to the few companies which can afford to bid and buy.

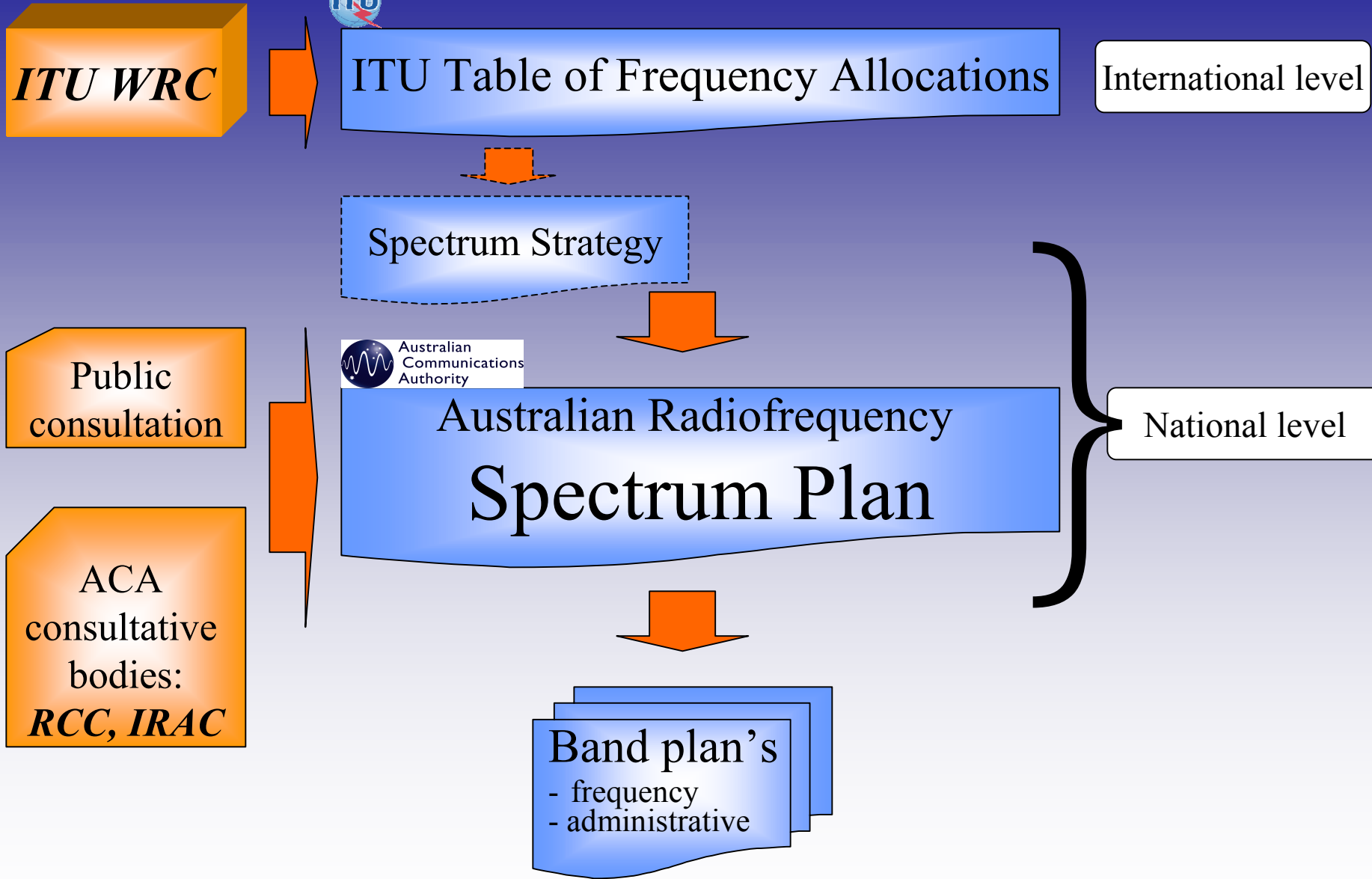
This happens in both broadcasting and radiocommunications.”

Stewart Fist, *CROSSROADS The Australian*, June 1998

Key elements of spectrum management



Spectrum Planning



Licensing and device registration framework



Apparatus Licensing

FS, MS, SS,

Site specific
Device specific

- Device certification
- Defined protection ratios
- Published co-ordination procedures

All devices registered - for easy co-ordination

Tradeable, leasible

**National public-access
Database Asset**

Non-specific
"public Park"

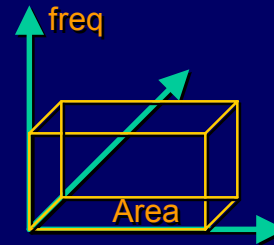
**Class
Licensing**

Mass-market devices – dedicated 'park'
Non-mass-market devices – negotiated co-existence

Spectrum Licensing

Area specific
semi-Service specific

- Device certification
- Notional receiver
- Approved propagation modelling methods
- Clear technical interference framework



Apparatus x Spectrum Licences

- *Apparatus licensing*—traditional—usually involves frequency coordination between known sites with specific types of devices with known characteristics
- *Spectrum licensing*—new paradigm—requires the protection of an area with generalised characteristics that are trying to be technology neutral
 - therefore need to protect an area for the duration of the licence
 - protecting the right to future device deployment

Auction

(price-based spectrum allocation)

“Where demand exceeds offer”

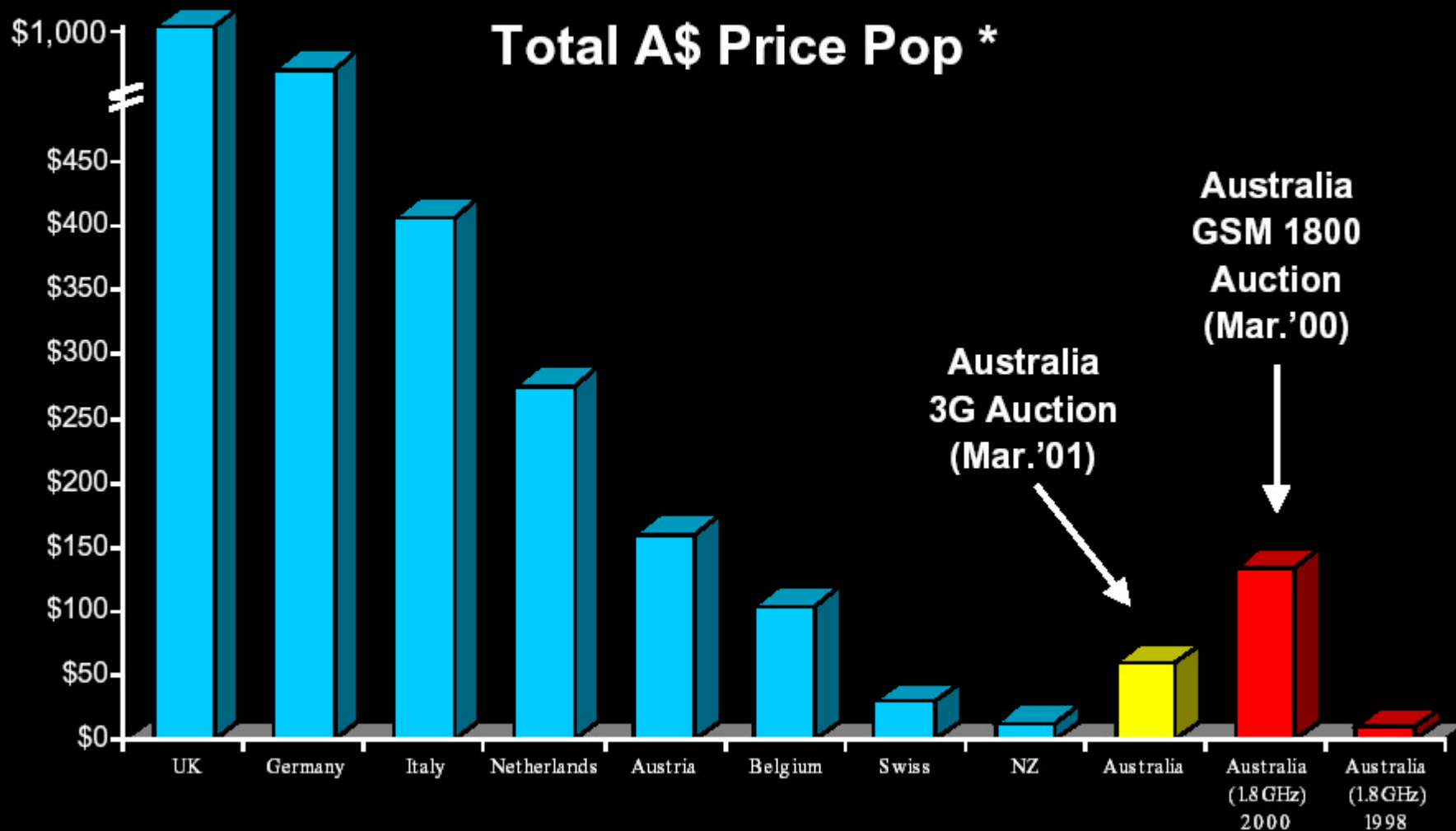
- 1st auction: MDS (Multipoint Distribution Stations), 2300 MHz (1994-95)
- ...
- PCS : 800 & 1 800 MHz (1998), 800 MHz (1999), 1.8 GHz (2000)
- ...
- 3G: 2 GHz (2001)
- ...

ACA's **Forward Program** of future spectrum auctions (<http://auction.aca.gov.au>):

- FWA: 3.4 GHz (current project)
- ...
- 3G: 2.5 GHz (low priority)



Australian 3G Spectrum Acquired At Low Cost



* Prorata to Australian population & 60MHz



Spectrum Trading



Radiocommunications Act 1992

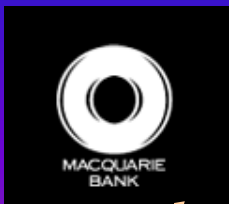
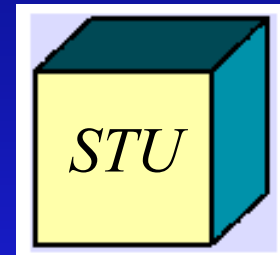
85 Trading spectrum licences

(1) ..., the licensee of a spectrum licence may assign, or otherwise deal with, the whole or any part of the licence.

Introduced in 1997
Applicable to spectrum
& apparatus licences
(e.g., 500 & 800 MHz,
2.3 & 3.4 GHz)

Standard Trading Unit: commodity-like unit of spectrum, covering the geographical area authorised by the licence.

STUs can be traded individually or in multiples.



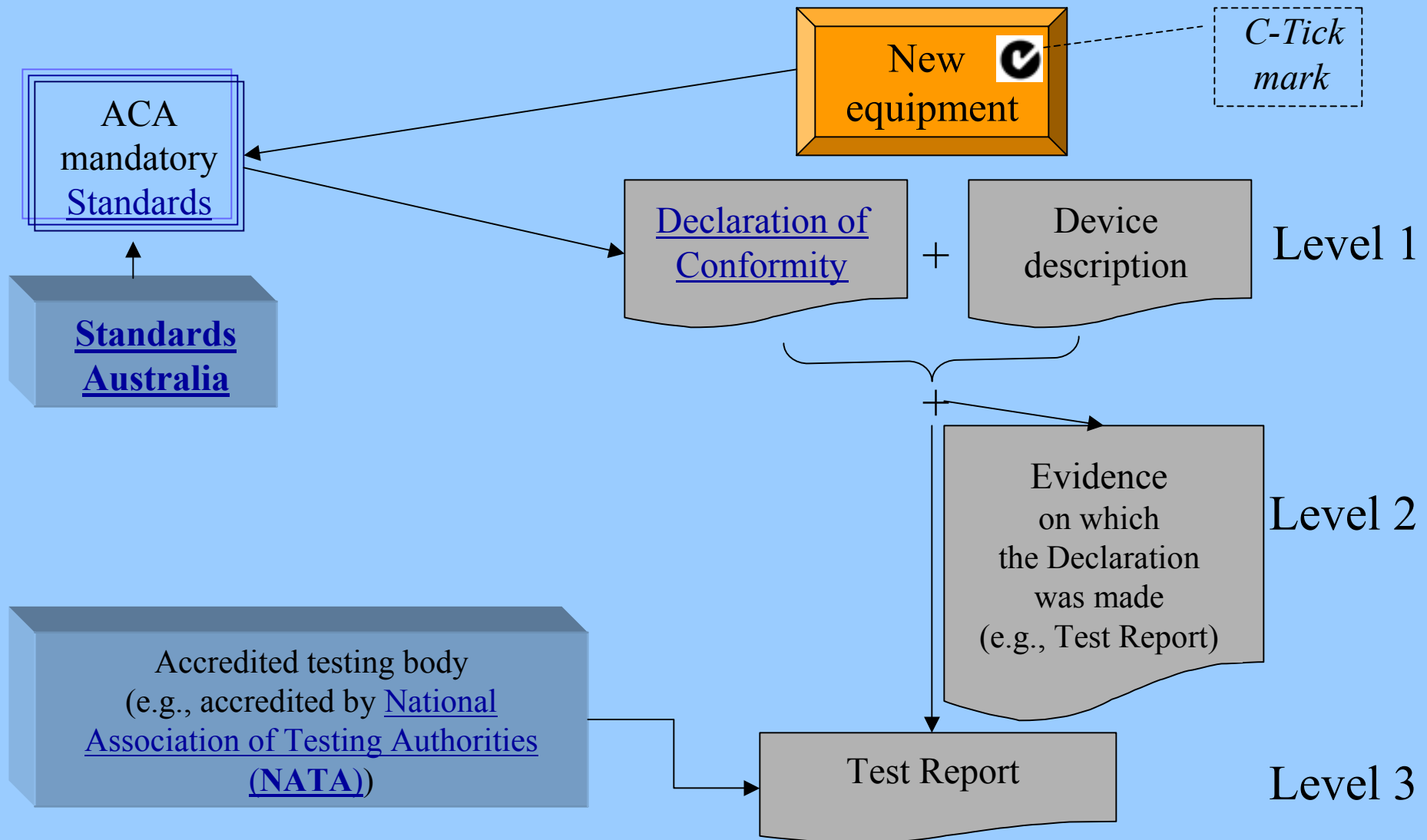
Secondary market/trading platform: online exchange for radio frequency spectrum (2002).

Spectrumdesk.com

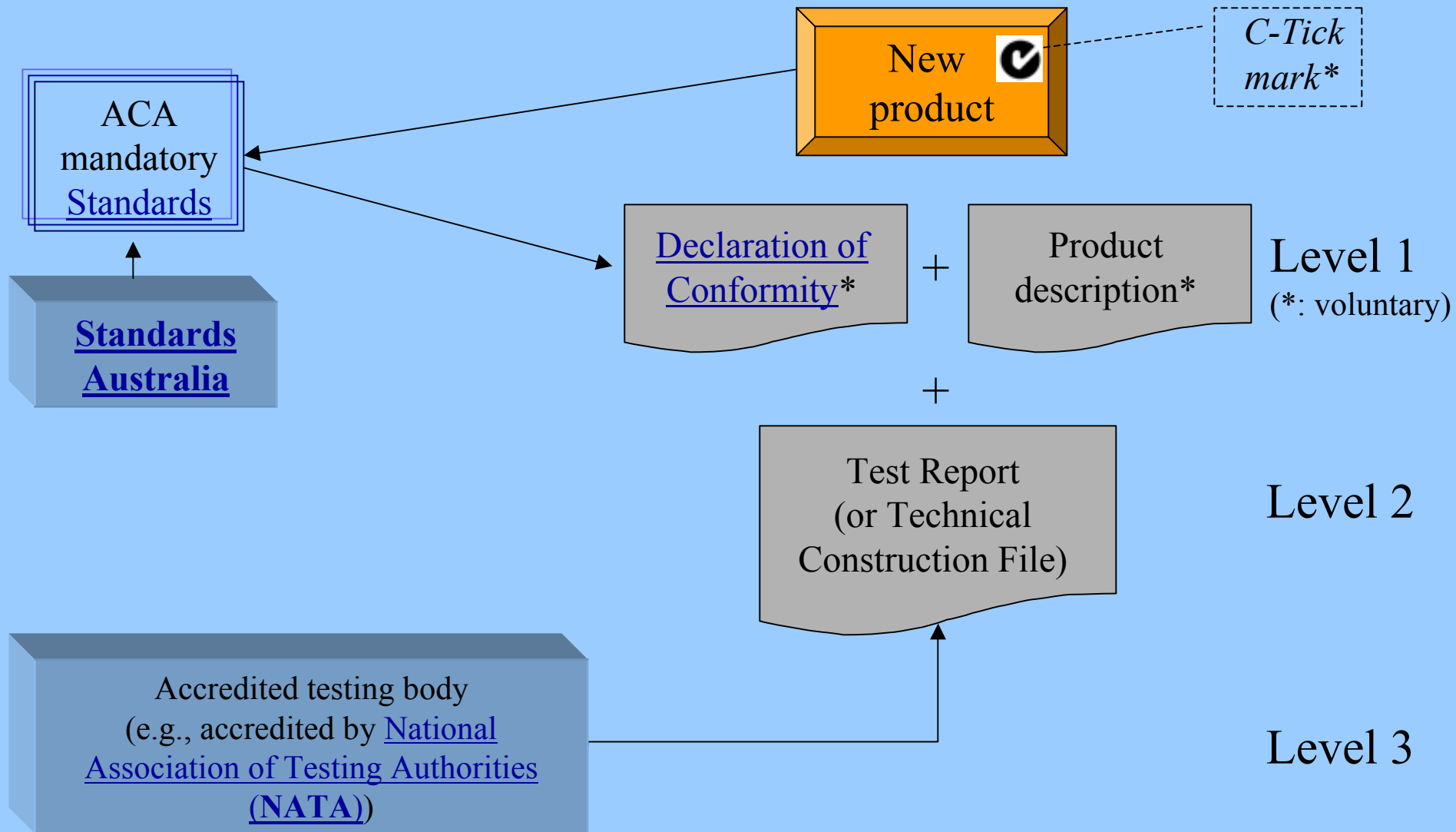


INTERNATIONAL TELECOMMUNICATION UNION

Radiocommunication equipment compliance arrangements

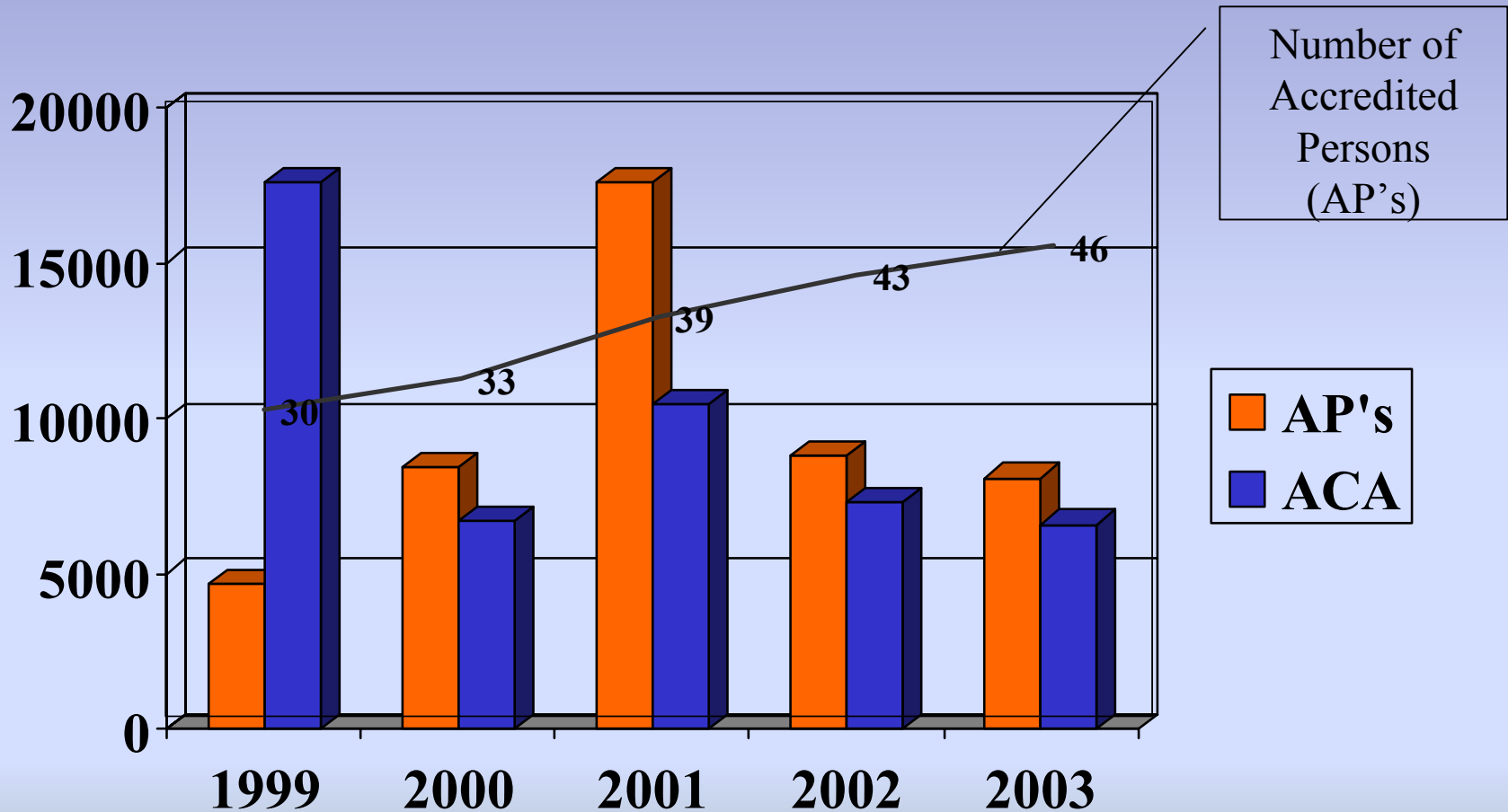


EMC product compliance arrangements



Accreditation Process

Number of assignments registered



WLAN/RLAN

1995

Consultation

Spread Spectrum (SS) Devices framework

1996

SS
Class Licence

RLAN in 2.4 & 5.8 GHz
(including 802.11b technology)

May
2000

Consultation

RLAN in 5 GHz band

Late
2000

LIPD
Class Licence

RLAN in 5.2 & 5.8 GHz
(including 802.11a technology)

Dec.
2002

SS
Class Licence

RLAN in 2.4 & 5.8 GHz
(update to include other technologies)

July
2003

LIPD
Class Licence

RLAN in 900 MHz, 2.4, 5.2 & 5.8 GHz
(update to include other technologies)

Jan.
2004

Consultation

RLAN & FWA in 5 GHz band post WRC-03



Ultra Wide-Band (UWB)

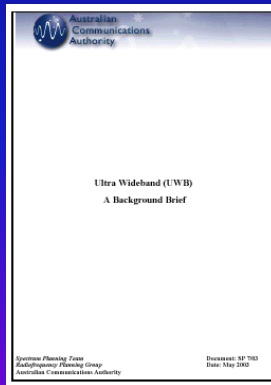


ITU-R
Recommendations
(SM-series)

FCC
Rules & Regulations
(Part 15)

ERC
Recommendation
(SRD)

2004



UWB licensing
arrangements

*Class
Licence*

Background paper
(May 2003)



Review/Reform Processes

- **Radiocommunication Review:** to evaluate the appropriateness, effectiveness and efficiency of the provisions of the *RCA* and related legislation and the associated administrative processes that underpin the regulatory framework for spectrum management in Australia (Final Report: August 2001).
- **Productivity Commission Inquiry:** to review the market-based radiofrequency spectrum management reforms incorporated into the *RCA* and related legislation and the performance of the ACA in administering these reforms (Final Report: December 2002).
- **ACA/ABA merger proposal:** consultation to enable a more complete consideration of the merits of a merged organization in comparison with retaining the existing institutional arrangements (on-going).

Spectrum Management in Australia

“Spectrum licensing in Australia is an important case study of modern spectrum management where a higher degree of flexibility is available for more spectrum efficient uses.”

(Motorola Labs, Paris, France, April 2001)

“The (Australian) framework is an innovative variation on conventional interference management techniques.”

“A number of other national authorities... have begun to introduce a more generic approach to licensing access to radio spectrum... Of these, the Australian approach is the most fundamental reform of traditional spectrum management methods.”

(UK Cave Review, March 2002)