Implementation of DTTB Case Study - Australia

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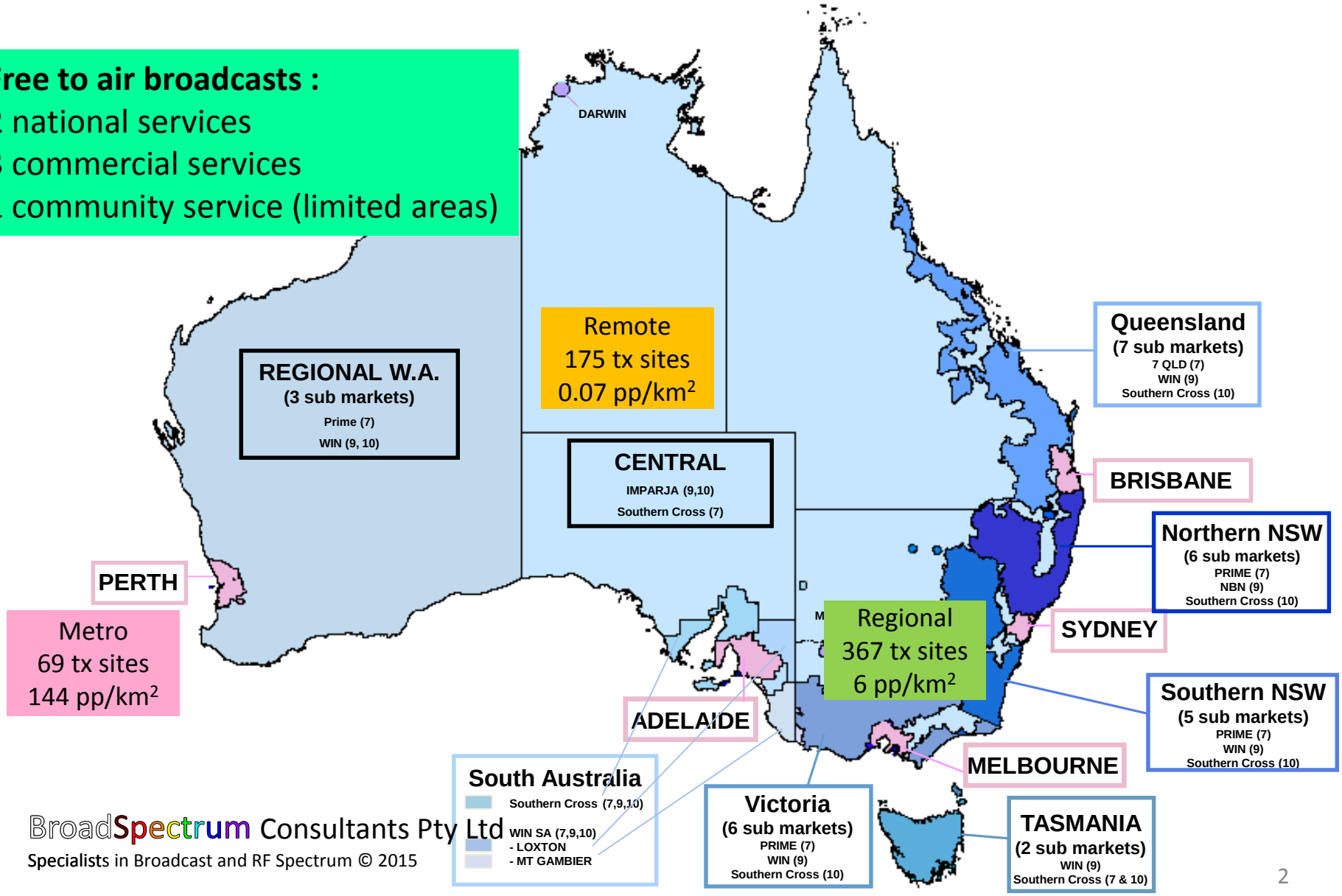
Australian Terrestrial TV Licence Areas

Free to air broadcasts :
2 national services
3 commercial services
1 community service (limited areas)



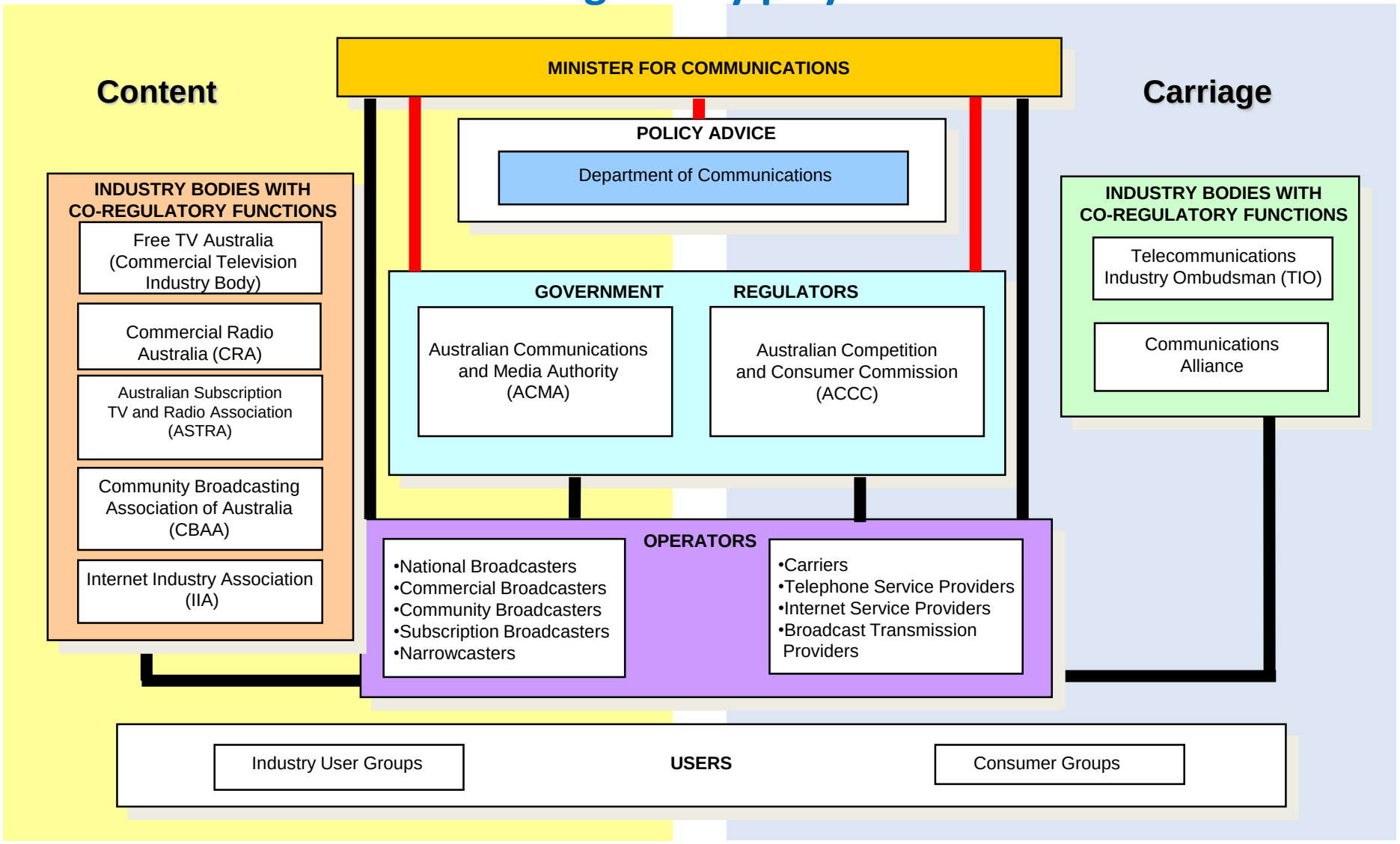
A Variety of Transmission Facilities

High Power VHF

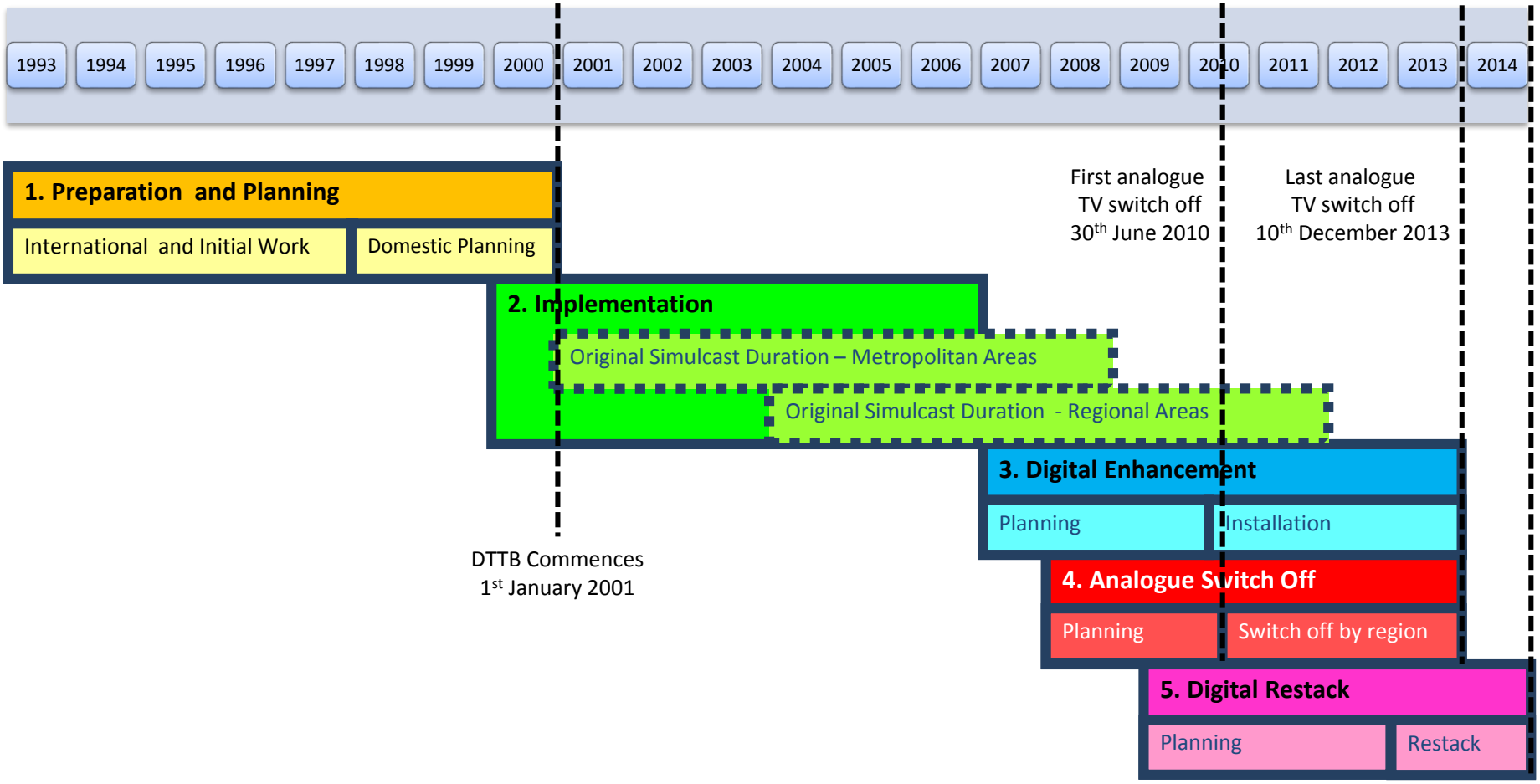
Medium Power UHF

Low Power UHF infill

Australian broadcast & communications environment – regulatory players



Roadmap Overview



Preparation & Planning

- ABA Specialist Group on Digital Terrestrial Broadcasting 1993 – 1997
- Broadcaster-led Specialist Group
- Selection Panel
  - Choice between ATSC and DVB-T
- Planning Implications
  - Same coverage; digital tx at analogue tx sites 6dB lower power
  - Urban, suburban and rural field strengths defined for Bands III, IV & V

Preparation & Planning 2

- Government Decisions
  - Broadcasters provided a 7MHz channel for digital
  - Metros commence 1/1/01, Regionals 1/1/04
  - Nominally an 8 year simulcast
  - Minimum quota of HD (20 hours / week)
  - Triplecast (SD/HD/analogue)
  - No multichanneling, but can “multiview”
- Technical Decisions
  - DVB-T MPEG-2 SD/HD
  - No SI “cross carry” (no multiplex operator)
    - Implications for “interference”
  - HD bitrate compromised by SD
  - Audio up to 5.1
  - captioning

Transmission Standard

Digital television—Terrestrial broadcasting
Part 1: Characteristics of digital terrestrial television transmissions
AS4599.1.

Coding
- Video / Audio Implementation ETSI TS101154
- Video / Audio Spec ETSI TS102005
- IP Framework ETSI TR102033
- MPEG2 over IP ETSI TS102034
- DSM-CC AS/NZS 13818-6

Teletext / Subtitles
- Conveying in System B ETSI EN300472
- Enhanced Teletext ETSI EN300706
- VBI in data in DVB ETSI EN301775
- Closed Captions OP42

Service Information
- Service Info ETSI EN300468
- Service Info Implementation ETSI TR101211
- Service Info codes ETSI TS101162
- TV Anytime ETSI TS102323
- ONID & NID Allocations OP40
- Electronic Service Guide OP44
- LCN OP41
- Time Related Tables OP45
- Content Codes OP39
- EIT Schedule OP58
- Service Replacement Service OP43

Data
- Data Broadcasting ETSI EN301192
- Data Broadcasting Implementation ETSI TS101202
- Software Update ETSI TS102006
- SSU OP46

Modulation
- Framing & Modulation ETSI EN300744
- MIP for SFN ETSI TS101191
- DVB-H ETSI EN302304
- DVB-T Implementation ETSI TR101190
- DVB-H Implementation ETSI TR102377

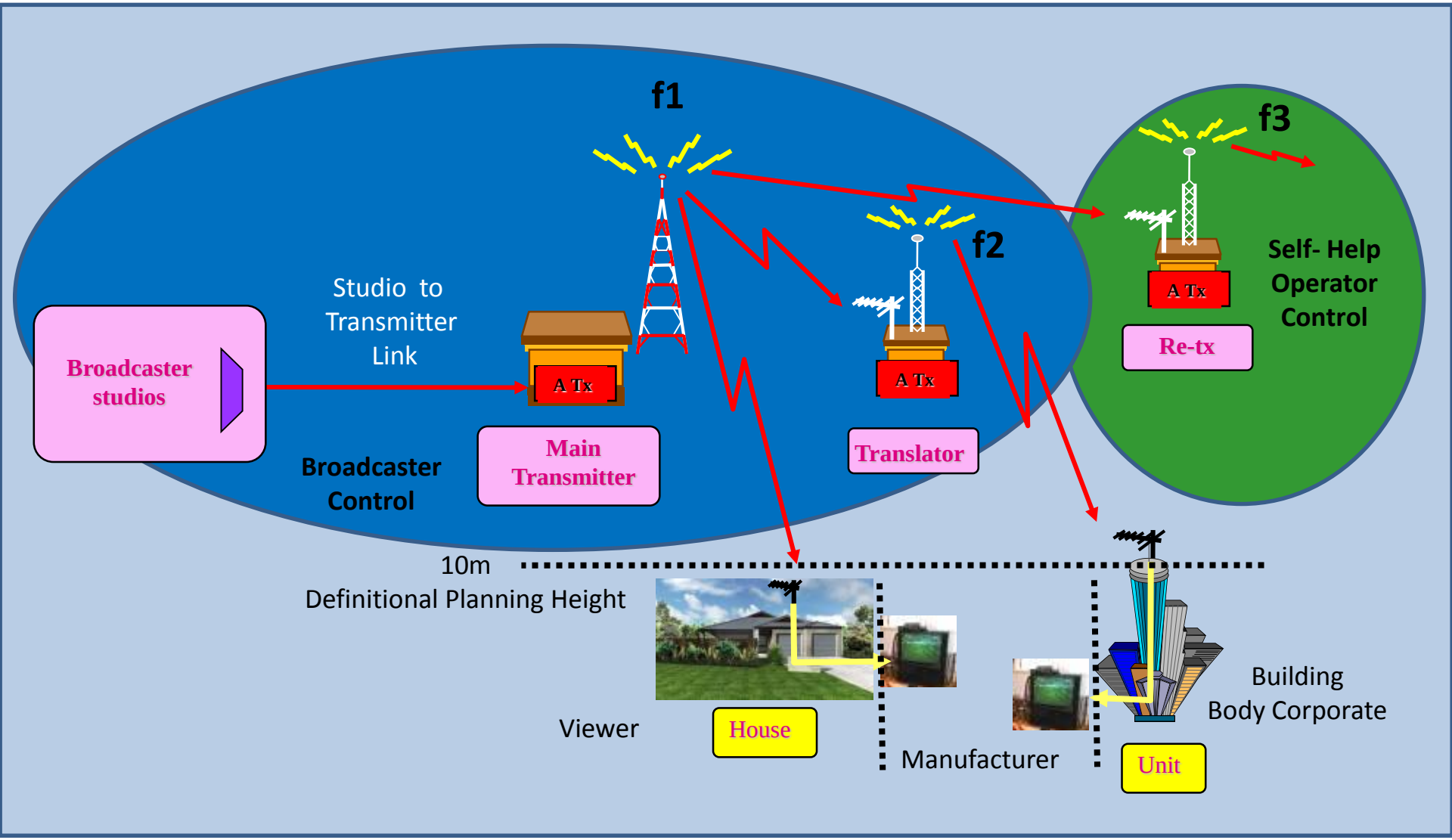
Others
- Misc Standards covering Conditional Access Interactive Middleware Copy Protection Measurement

DVB / ETSI Standards etc

Broadcaster Operational Practices

Note : System Characteristics have changed over time.
2011 Version indicated.

Broadcast Structure (Pre Digital)



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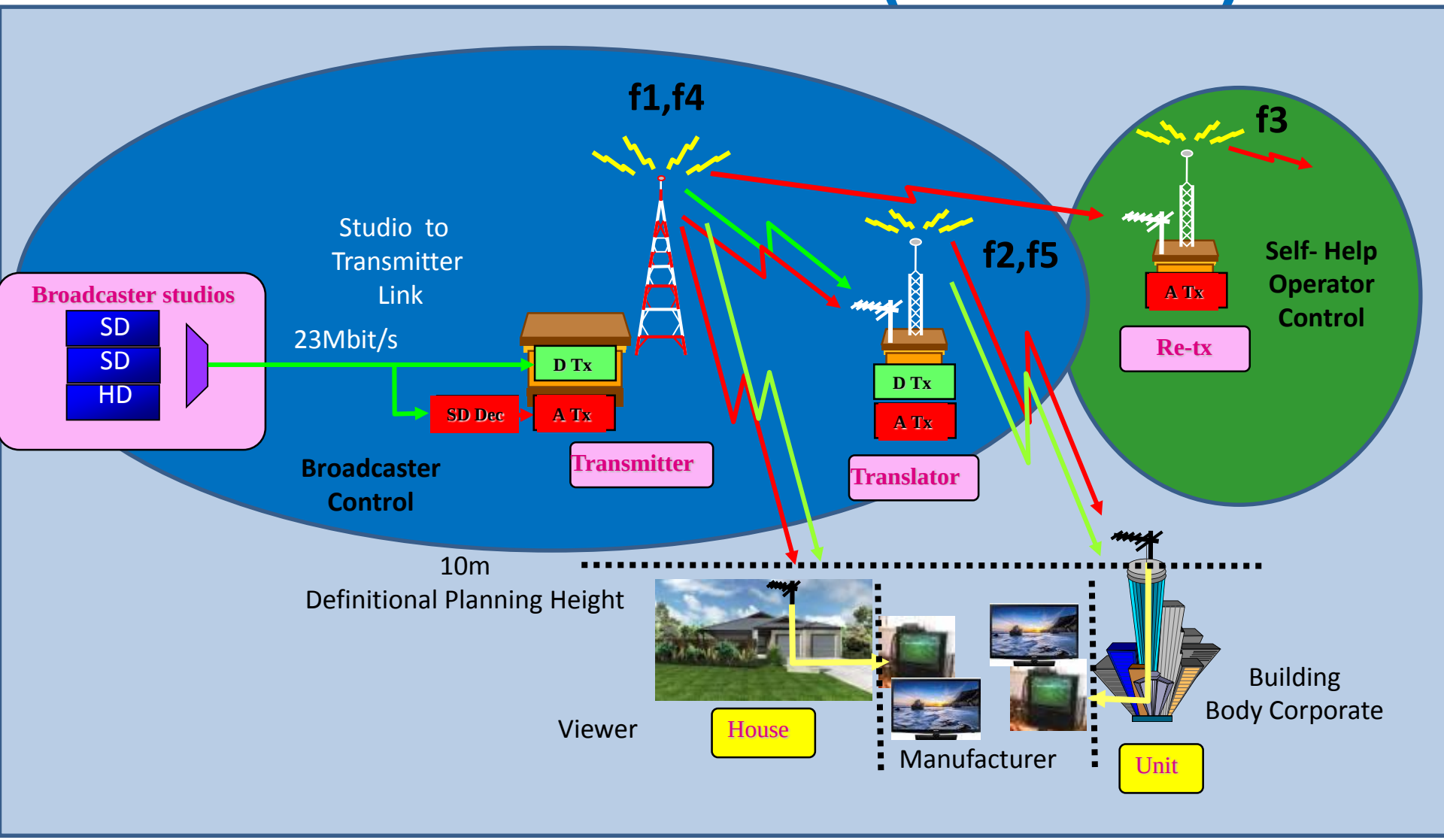
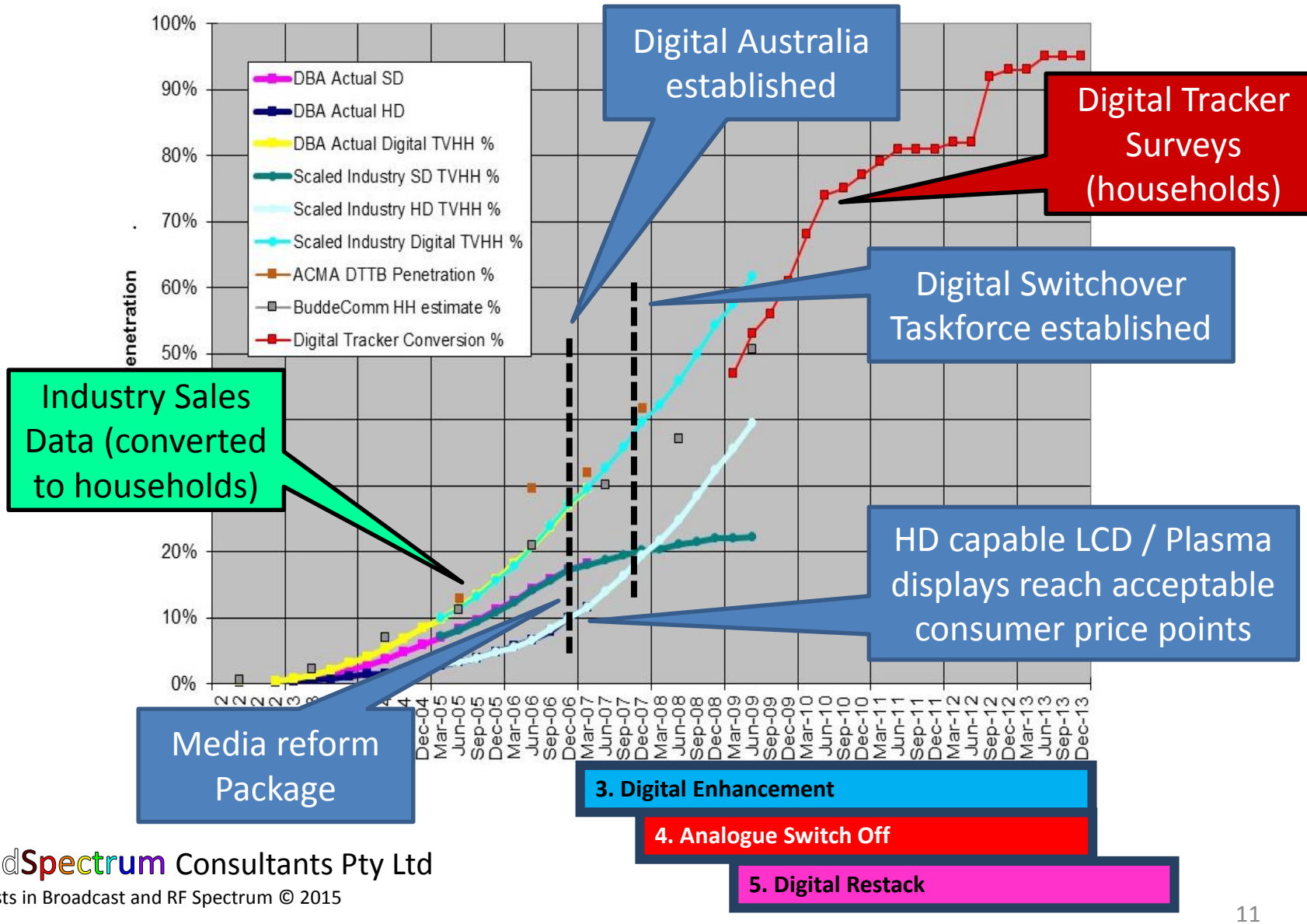
Broadcast Structure (Simulcast)



Australian DTV Growth



Digital Reception Issues

- Interference Management Scheme
- Educate viewers / market to “cliff effect” of digital
- Antenna maintenance “Analogue Antennas”
- Masthead overload / high receive levels
- Local clutter / moisture
- Knife edge diffraction
- SFN design
  - Same frequency, time, data
  - “mush zones”
  - Failures mean interference
- Receiver software design

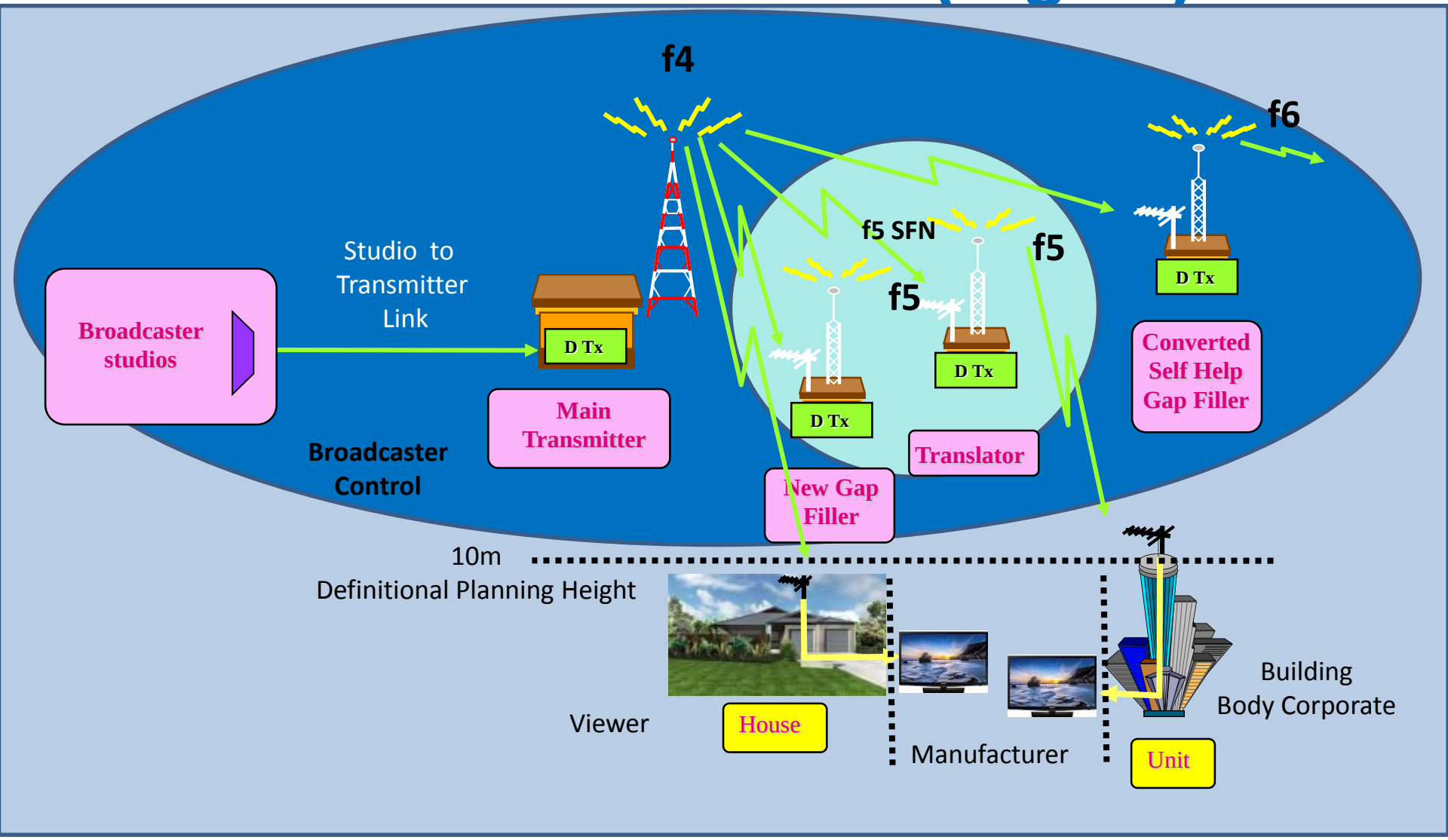
Digital Enhancement

- Broadcaster review of underserved areas
- Gap filler planning
  - Metropolitan Licence Area Key Issues
    - Future-proofing, Growth areas, Building clutter
  - Regional Licence Area Key Issues
    - Growth areas, vegetation along riverbanks
  - ACMA insist on suburban field strength levels
- TV “Black spot” sites converted by broadcasters
- Viewer Access Satellite Television service (VAST)
- Coverage
  - Metro areas: 99.4 – 99.7%
  - Regional areas: > 98%

Analogue Switch Off

- Activities co-ordinated through DSTF
- Government Assistance Schemes
  - Households Assistance Scheme
  - Satellite Subsidy Scheme
- Monthly Transmission & Spectrum Working Group meetings
  - Broadcaster advice on gap filler roll out
  - co-ordination of govt resources and information
- Switch off Regions
  - Legislated 6 month switch off “windows”
  - Mildura test market 30/6/2010
  - Melbourne last major market 10/12/2013

Broadcast Structure (Digital)



Restack Objectives

1 clear the digital dividend band of broadcasting services as soon as practicable;
2 plan for six digital channels at each transmission site;
3 plan for six VHF channels at all metropolitan main station sites;
4 plan such that coverage of all six channels is similar;
5 maintain or improve digital television coverage;
6 simplify viewer reception of terrestrial digital television;
7 establish spectrum planning arrangements that support future needs;
8 retain 14 MHz of spectrum in VHF Band III for possible expansion of digital radio;
9 comply with the legislated framework;
10 consistent with the minister's direction, the ACMA should wherever possible:
   a) minimize viewer costs and disruption;
   b) minimize commercial and national broadcaster costs.

   In licence area overlap regions, nine services per site would be planned at existing transmission sites.

Restack Planning Principles

Principle 1 : Use Ch 6 – 12, 28 – 51

Principle 2 : create sub-band for DAB+ in Ch 9 9A

Principle 3 : Plan 6 digital channels in each area (9 for overlap regions)

Principle 4 : Plan so viewers have only one band antenna

Principle 5 : Plan services within defined blocks

Principle 6 : Channel assignment rules

Principle 7 : Transmission site block assignment rules

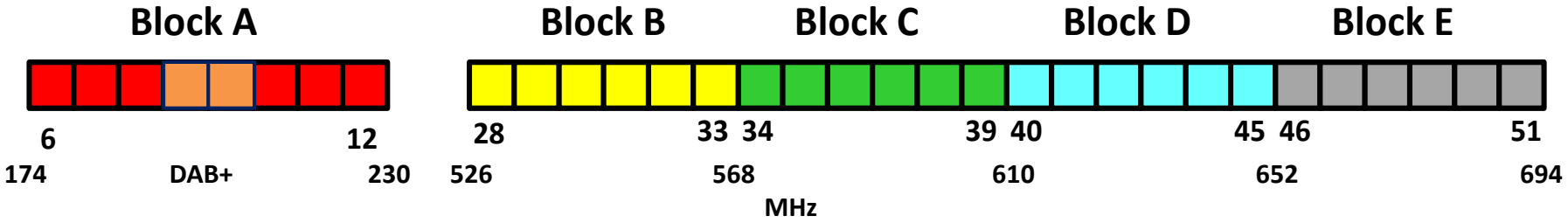
Principle 8 : Make all SFNs the same

Principle 9 : Plan for DVB-T 64QAM, 2/3 FEC, 1/16 GI with co-channel protection ratio (20dB) and defined field strengths

Principle 10 : Equalise technical parameters between broadcasters

Principle 11 : Determine timing windows for the restack

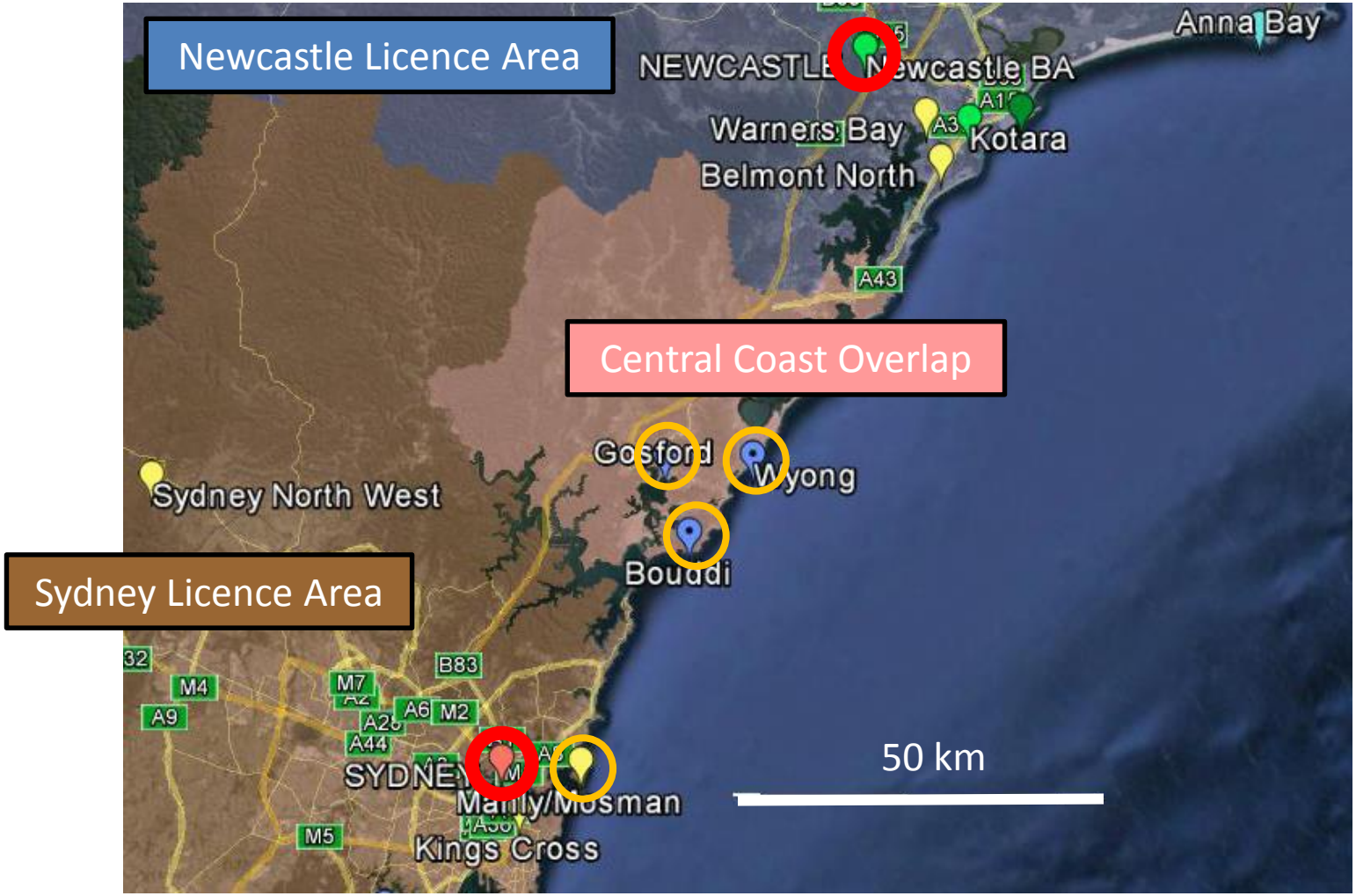
Restack Planning Model



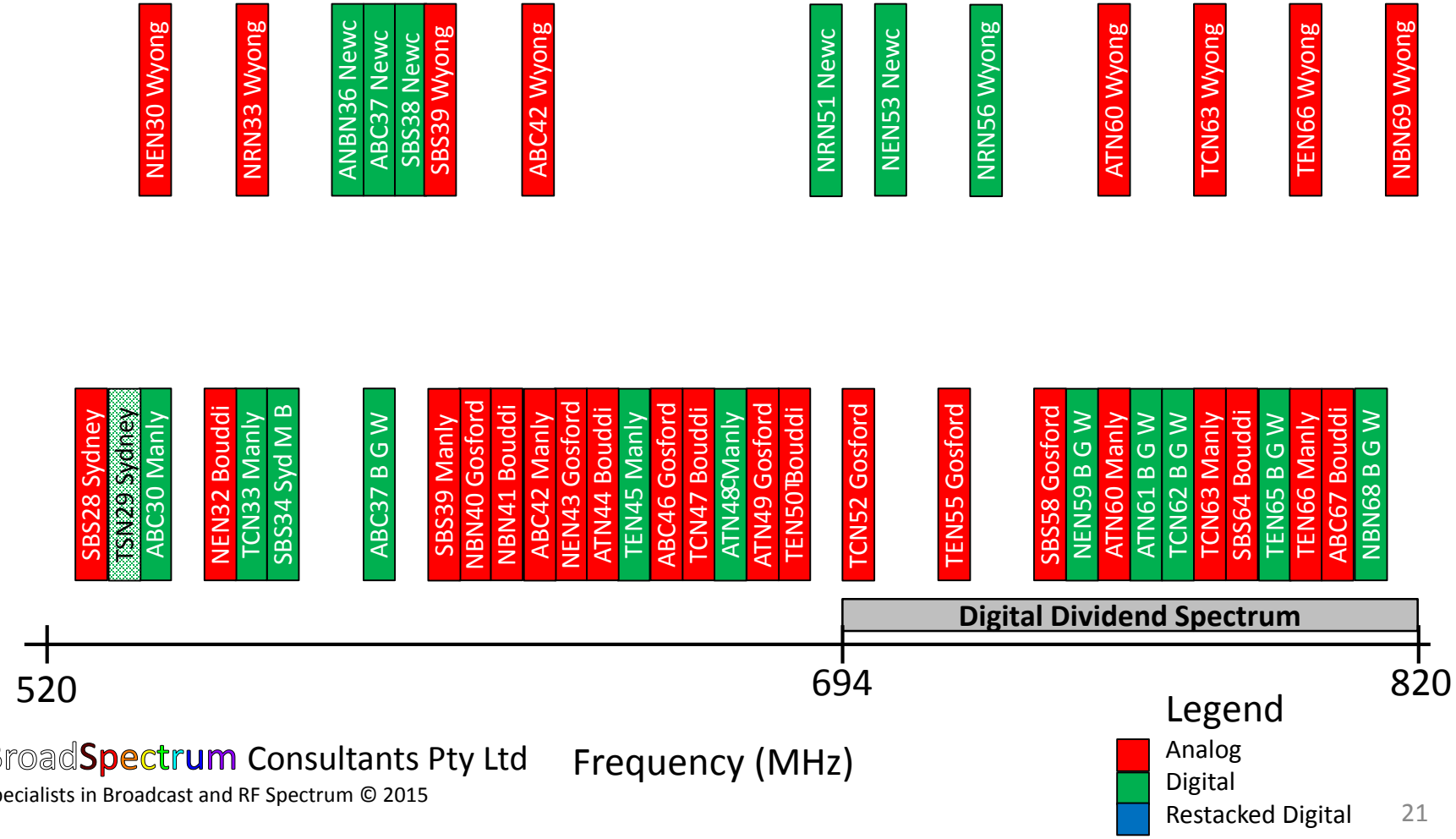
- Planning Methodology
  - Queensland study
    - 198 transmitters in Ch 52 – 69 needed moving
    - Minimal moves – added 46 move transmitter moves
    - Block Model – added 83 more transmitter moves
  - But, long term benefits of block model recognised
  - Nationwide 930 transmitters in Ch52 – 69 1,299 transmitters restacked including consequential moves

Public Information Campaigns

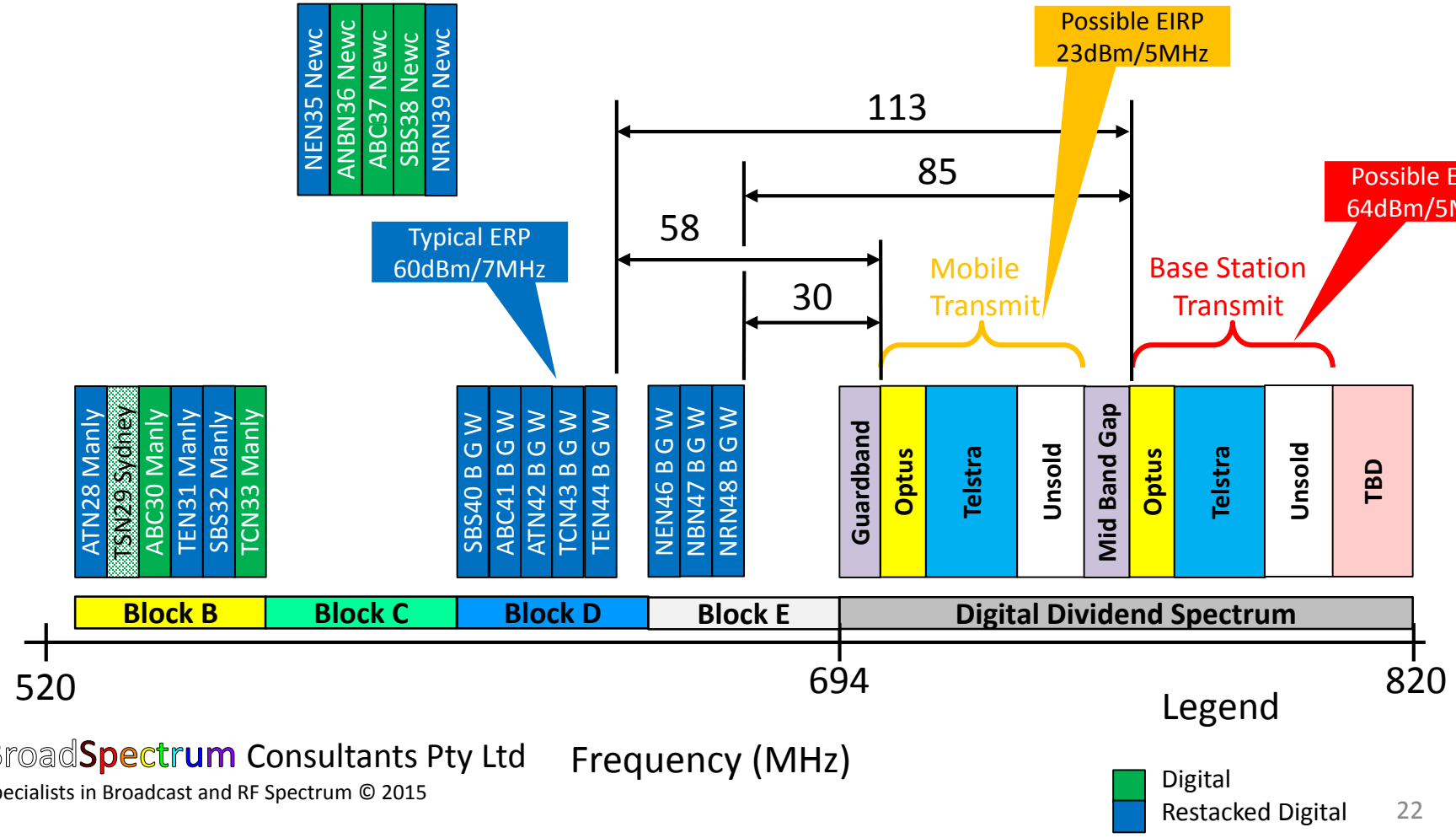
Restack Example



Spectrum Allocations Pre Sydney ASO



Restack and Spectrum Licences January 2015



Thank You for your attention

Questions?