



DTTB Implementation – Australia

Results and Effects of Digital Dividend

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(Broadcasting)

25th August 2015

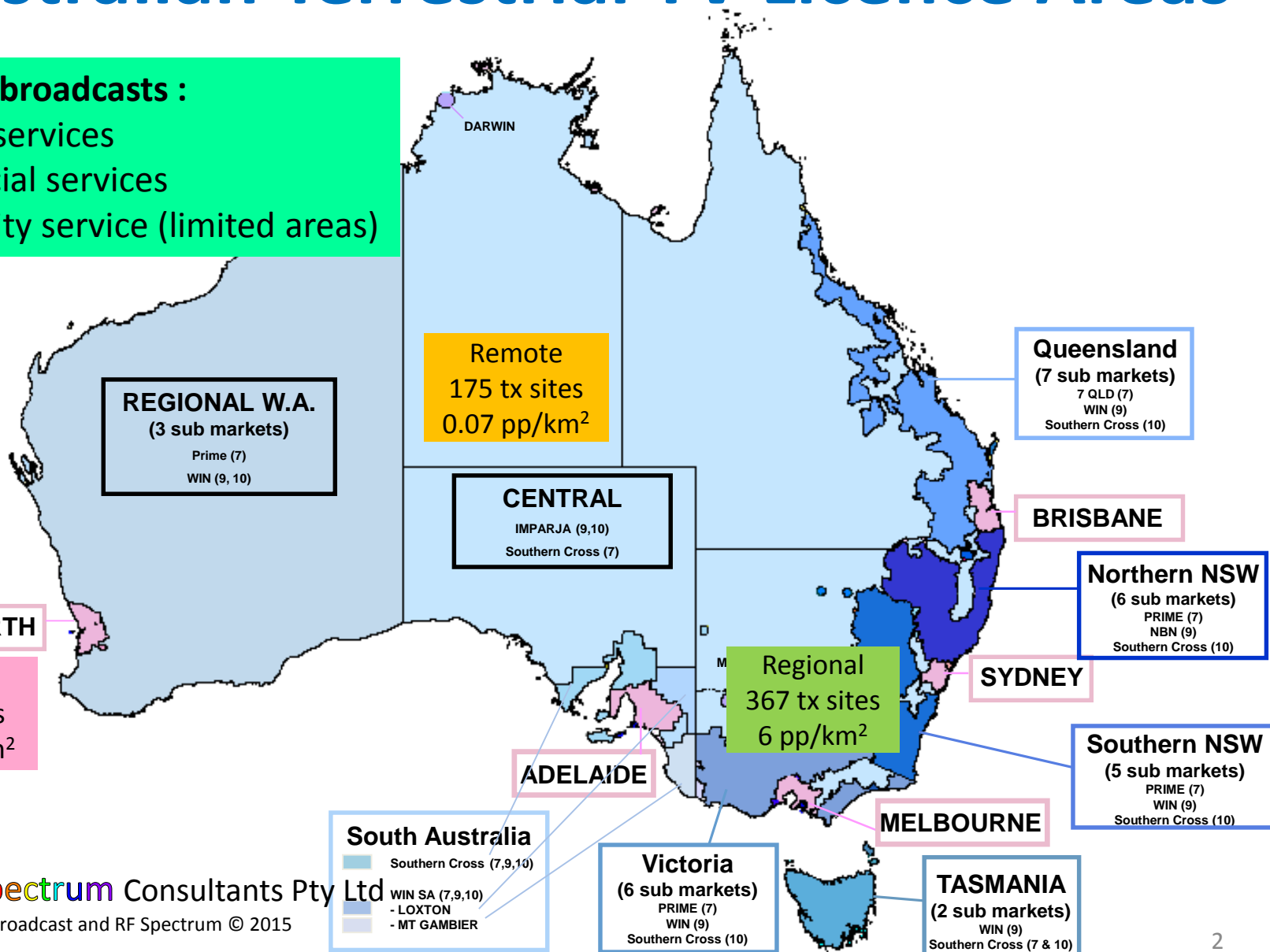
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Australian Terrestrial TV Licence Areas

Free to air broadcasts :

- 2 national services
- 3 commercial services
- 1 community service (limited areas)



A Variety of Transmission Facilities



High Power VHF



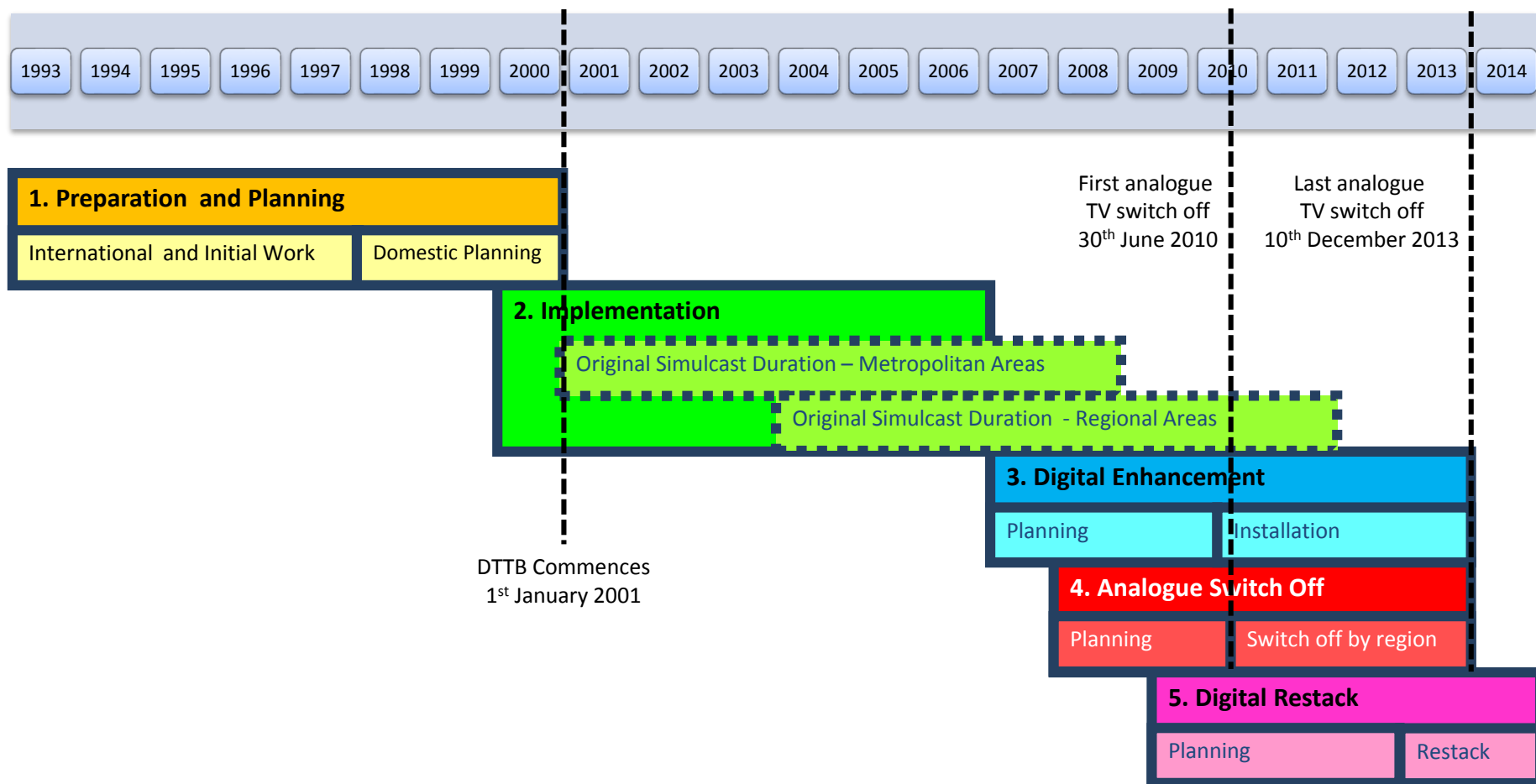
Medium Power UHF



**Low Power UHF
infill**



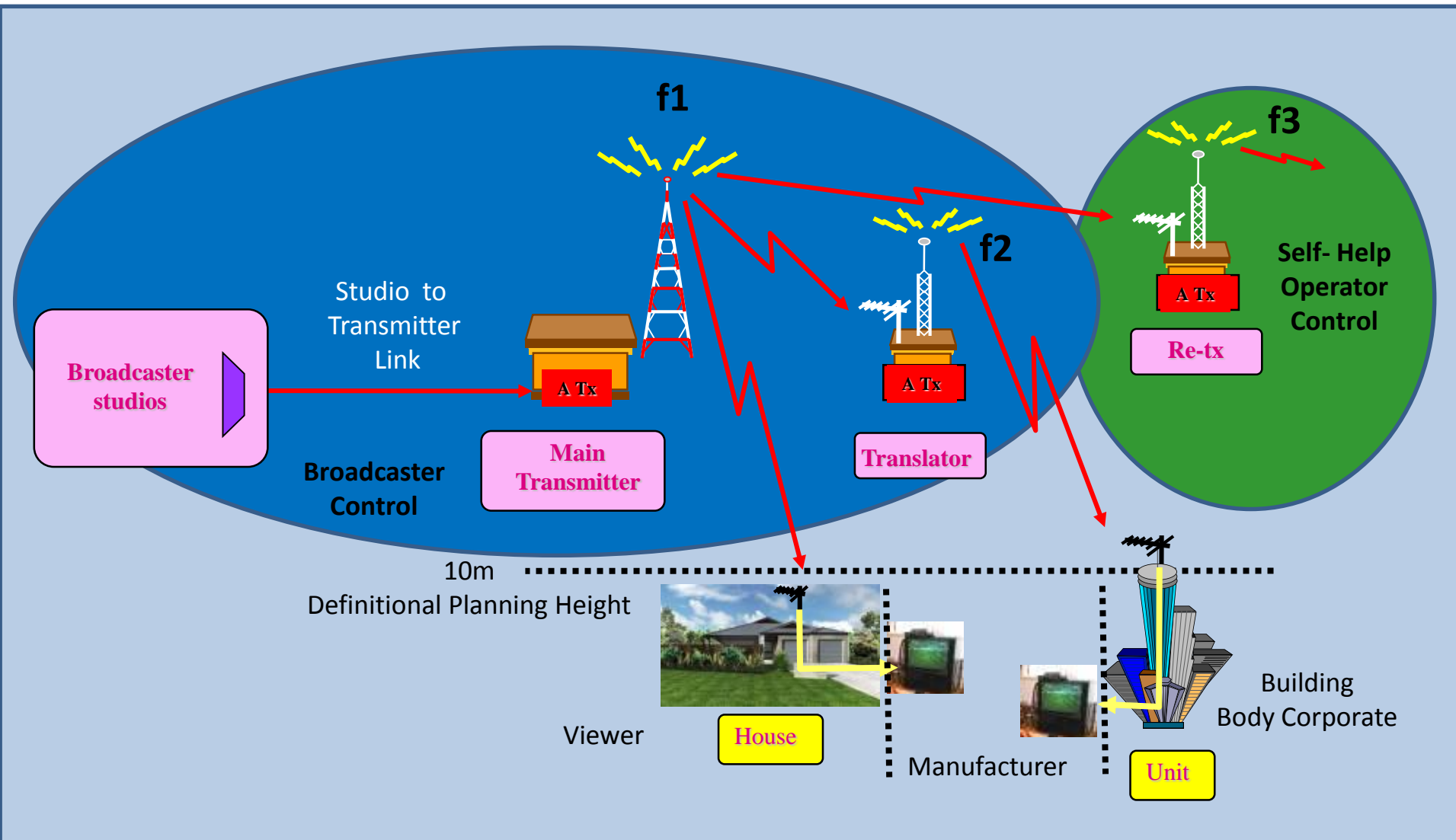
Roadmap Overview



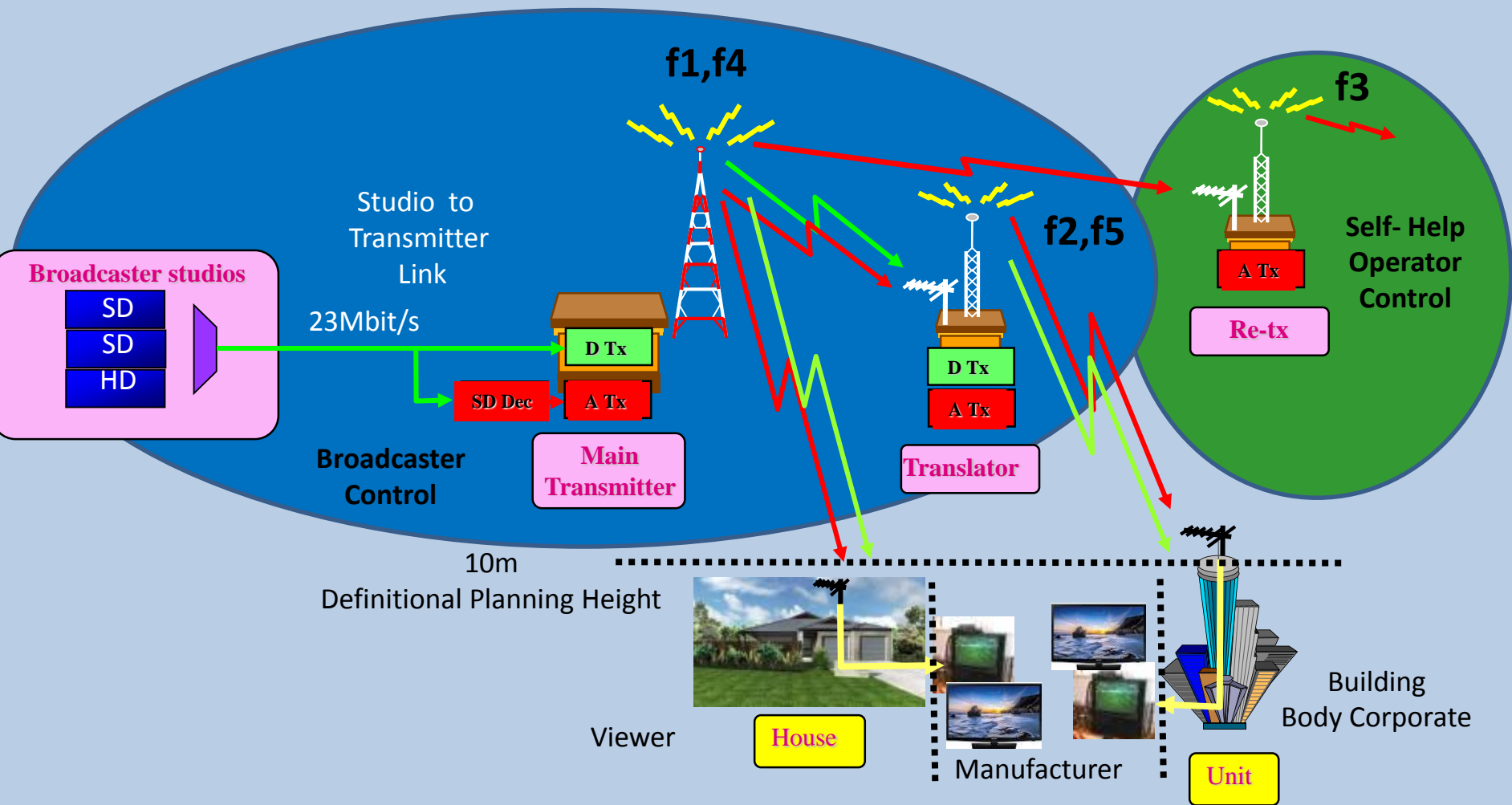
Initial Decisions

- 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
 - No Service Information “cross carry” (no multiplex operator)
 - Implications for “interference”
 - HD bitrate compromised by SD
 - Audio up to 5.1
 - captioning

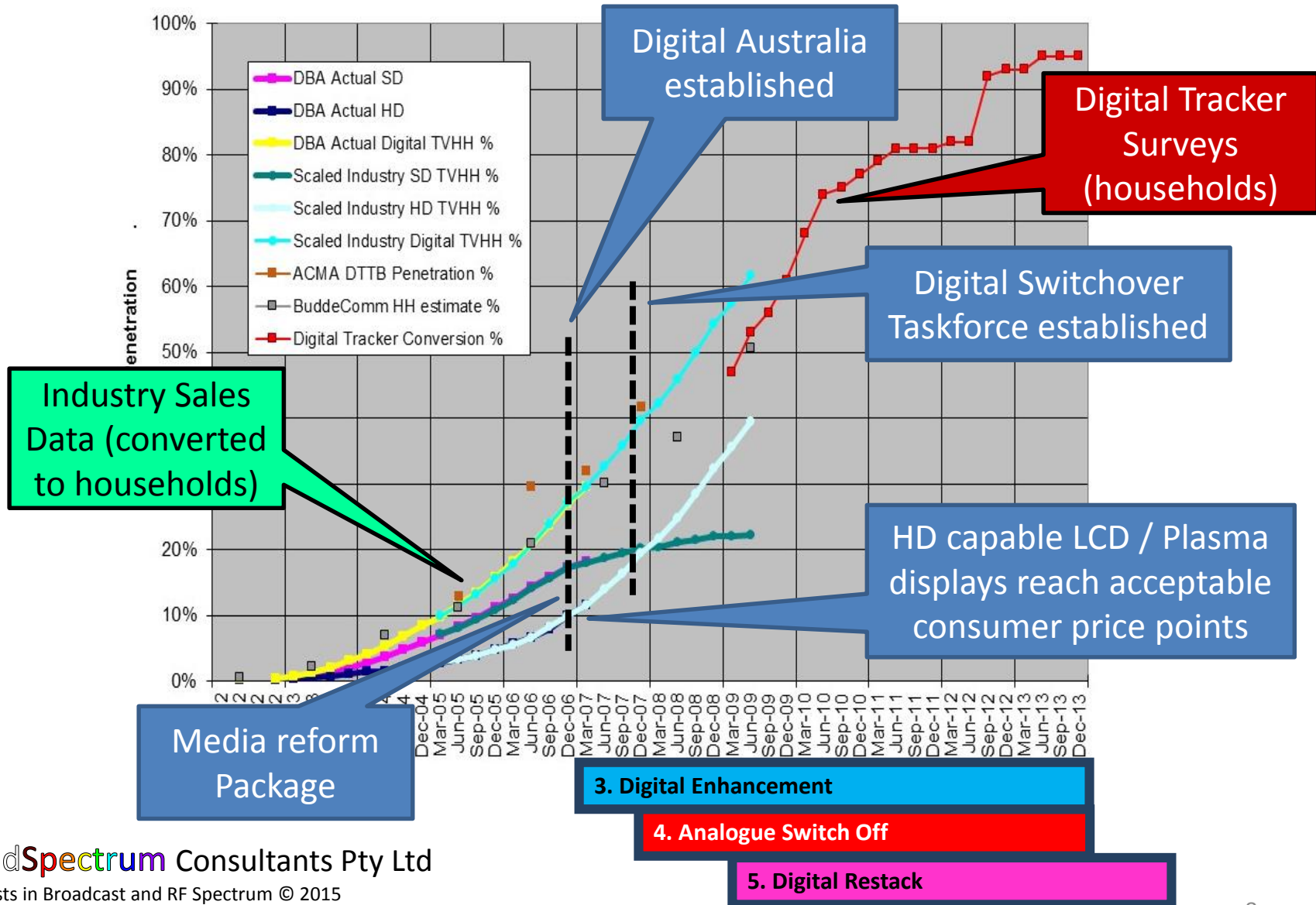
Broadcast Structure (Pre Digital)



Broadcast Structure (Simulcast)



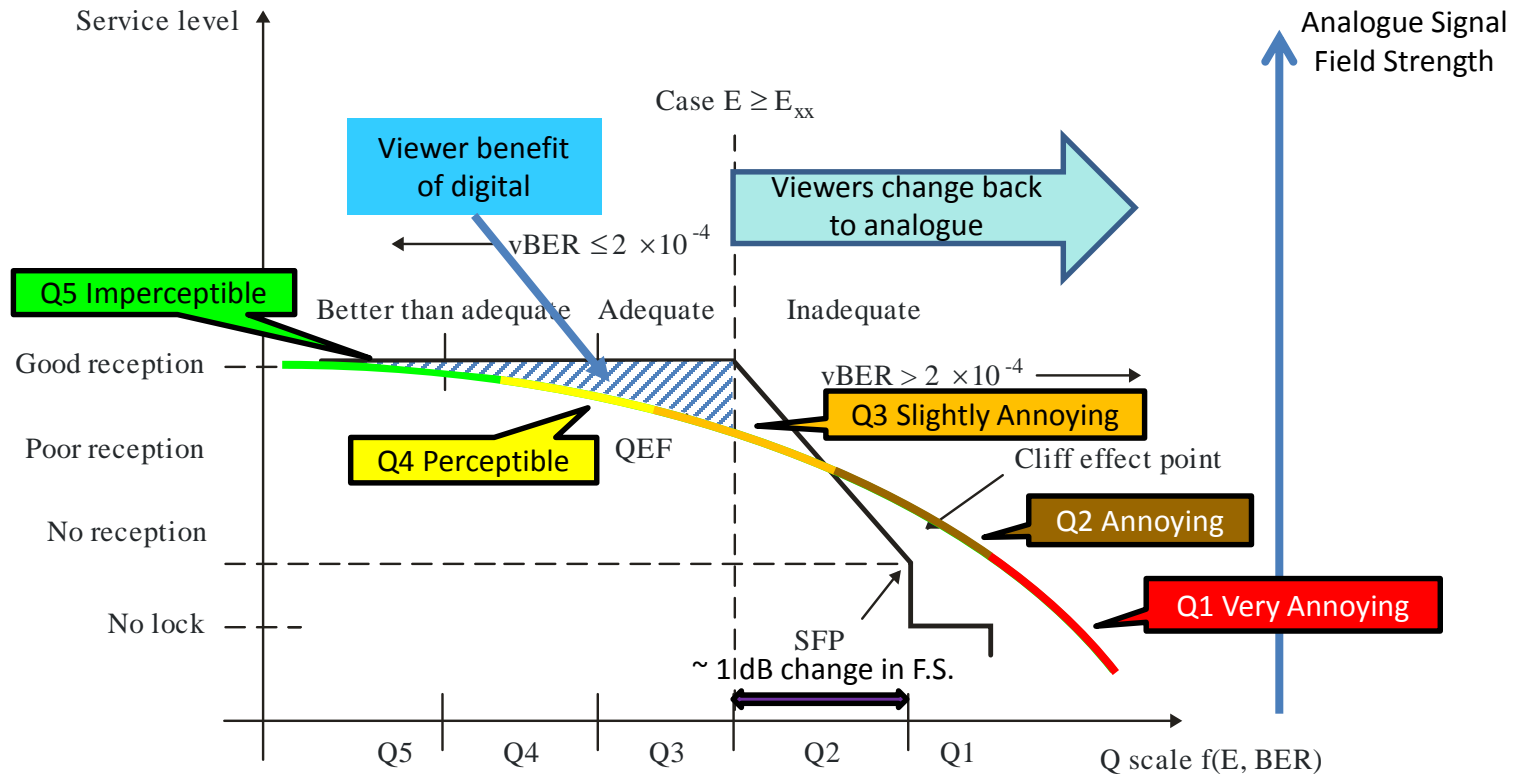
Australian DTV Growth



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

The Digital “Cliff Effect”



BT.1735-01b

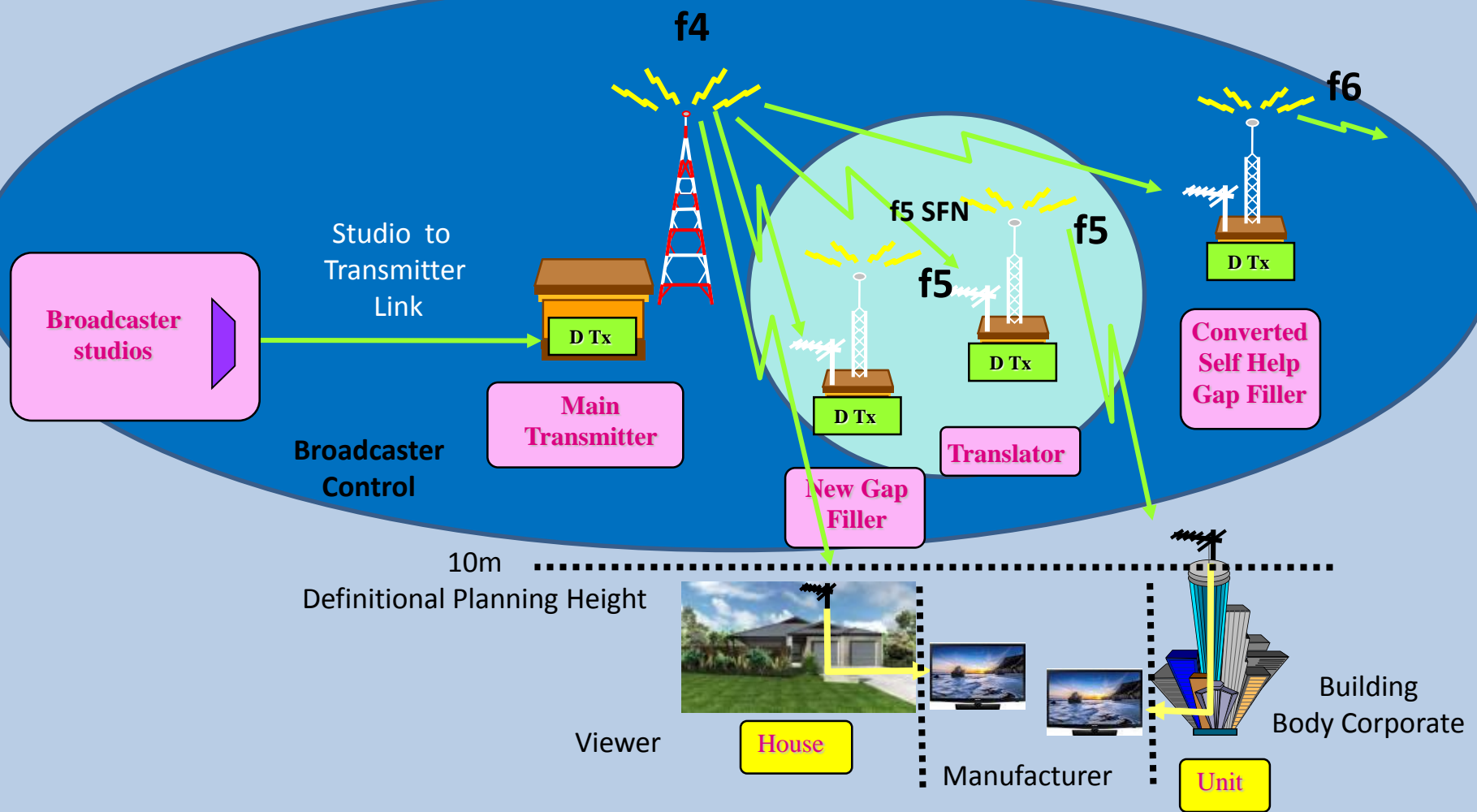
Digital Enhancement

- 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
- VAST
- Coverage
 - Metro areas: 99.4 – 99.7%
 - Regional areas: > 98%

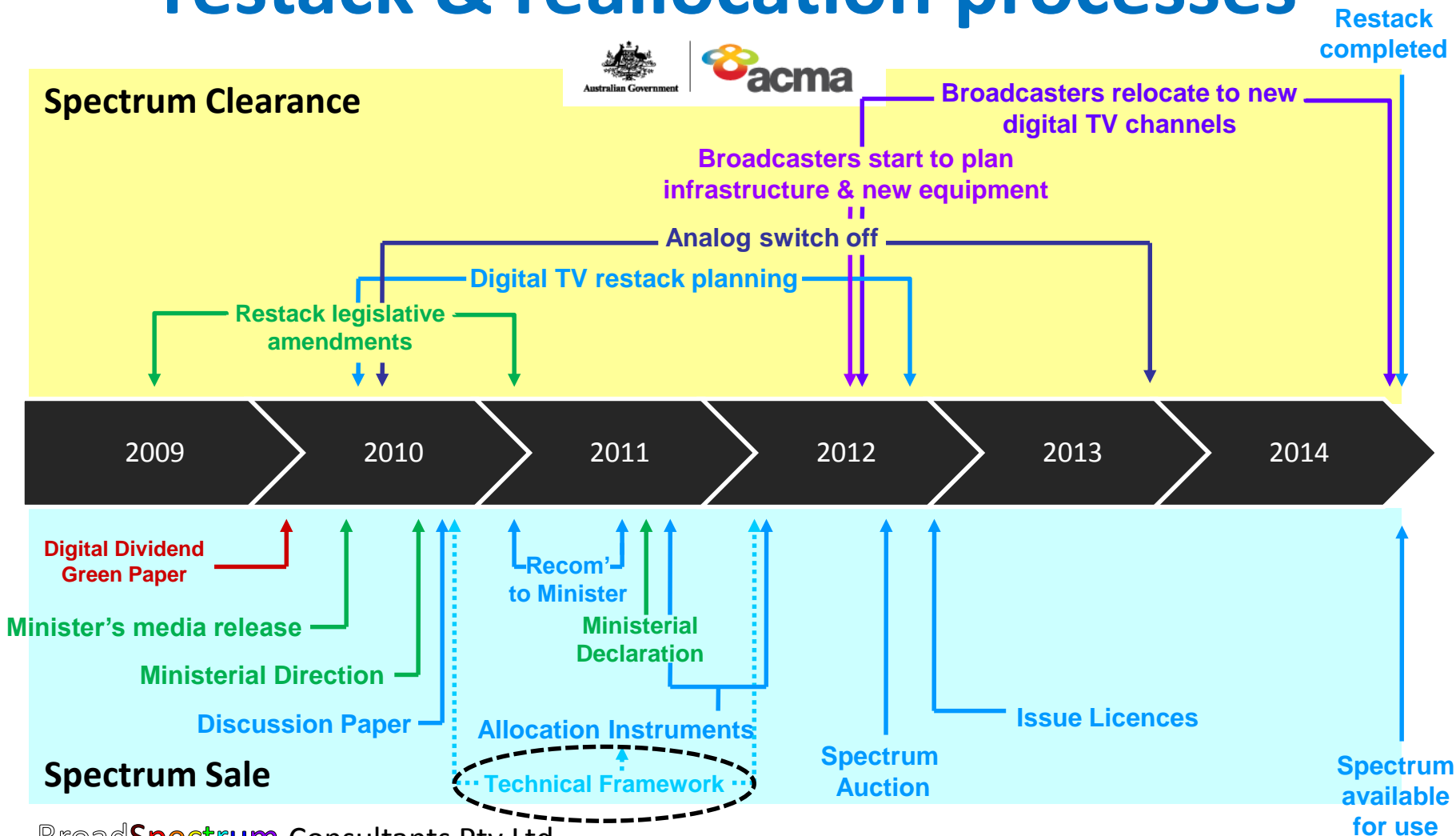
Analogue Switch Off

- 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)

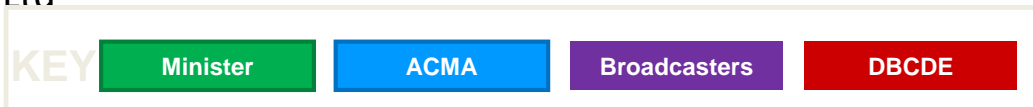


Yielding the digital dividend—the restack & reallocation processes



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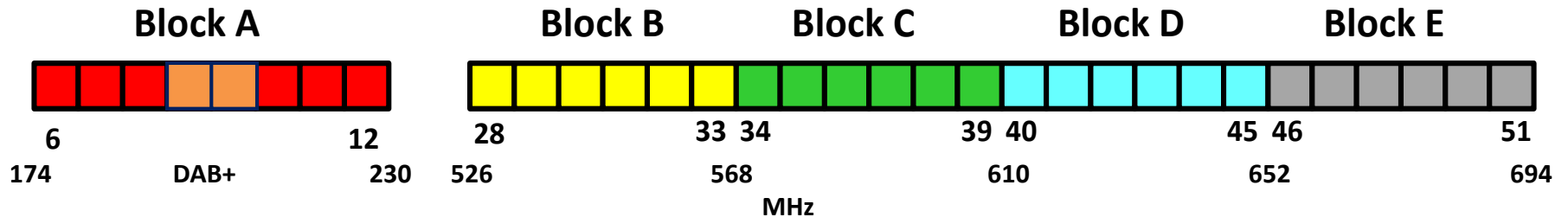


Restack Objectives

- 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 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

Success Factors

- The maintenance of a close working relationship between Government and Broadcasters
- Open communication with the public, to seek feedback on reception conditions and communicate changes
- The development of standards to modify a 'toolkit' of international standards to incorporate local requirements
- Planning each stage is key, every detail must be examined

Key Lessons

- **Set regular reviews** to examine if policy and technical goals are being achieved
- **Survey households** from an earlier stage to judge the success of the conversion
- Setting **target dates provides a firm goal** for all parties to work towards
- Effort is needed to **educate the public from ‘analogue’ to ‘digital’ thinking**; influencing perceptions of degraded reception (‘digital cliff’), channels to services and new features
- **Every householder’s reception conditions are different**, a variety of causes and solutions to reception issues need to be developed
- With respect to analogue switch off and the digital restack
 - Review digital coverage before considering the size of a digital dividend
 - Use the restack to remove legacy broadcast planning issues
 - A single retune day can be successful only after considerable planning

Restack Result – SE Qld / NNSW



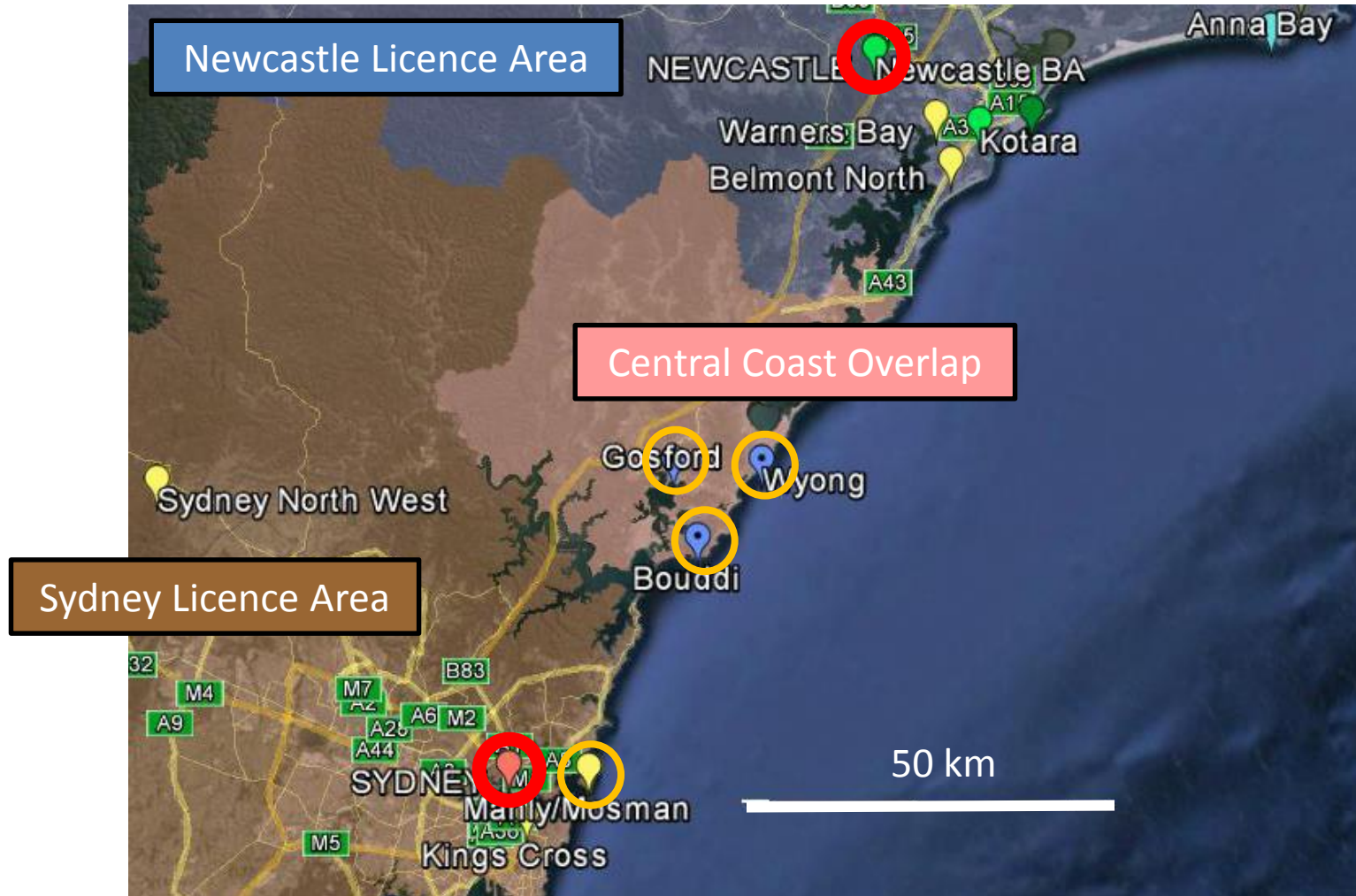
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Remaining Issues

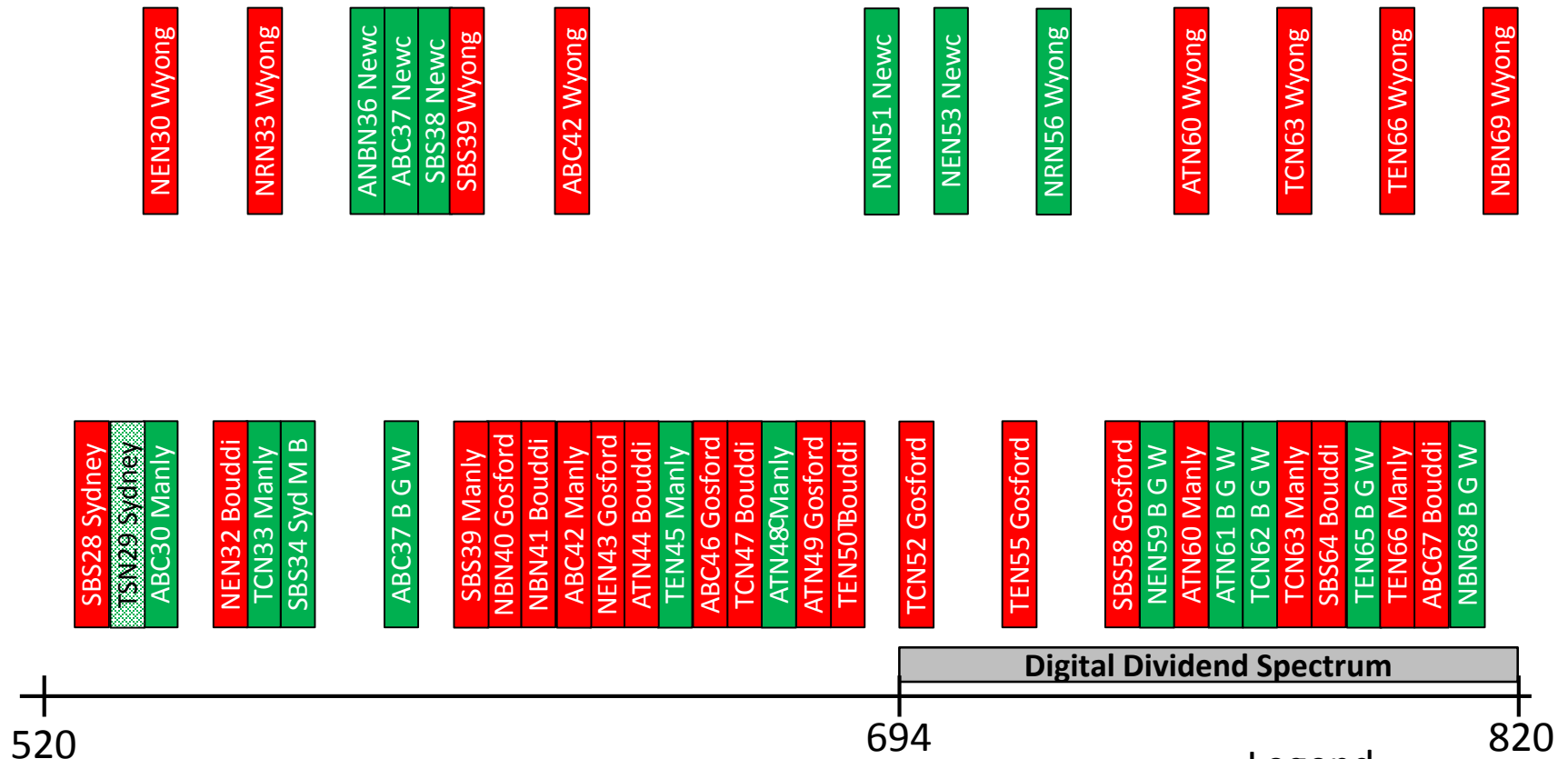
- Heavy channel re-use has resulted in instances of interference under particular conditions
 - “ducting” between Wollongong and Newcastle
 - Sunshine Coast and Gold Coast
- Filters needed in receiving systems when IMT (4G) systems commence
- Challenge of how to transition to the next broadcast technology infrastructure

Restack Example

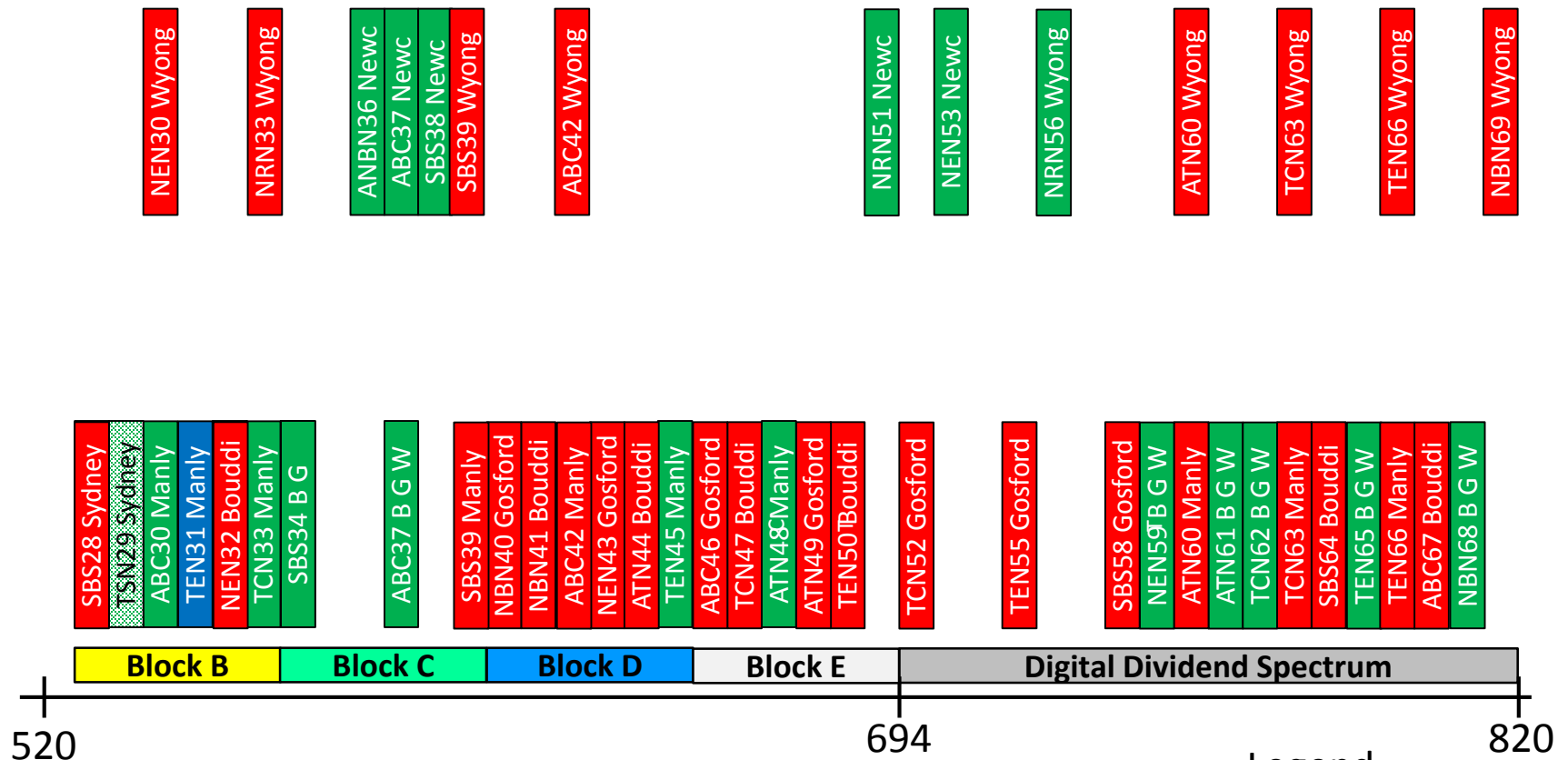


Spectrum Allocations Pre Sydney ASO

Note the spectrum congestion
Only 4 channels not used, but 8 channels reused



Post Sydney ASO / Simulcast



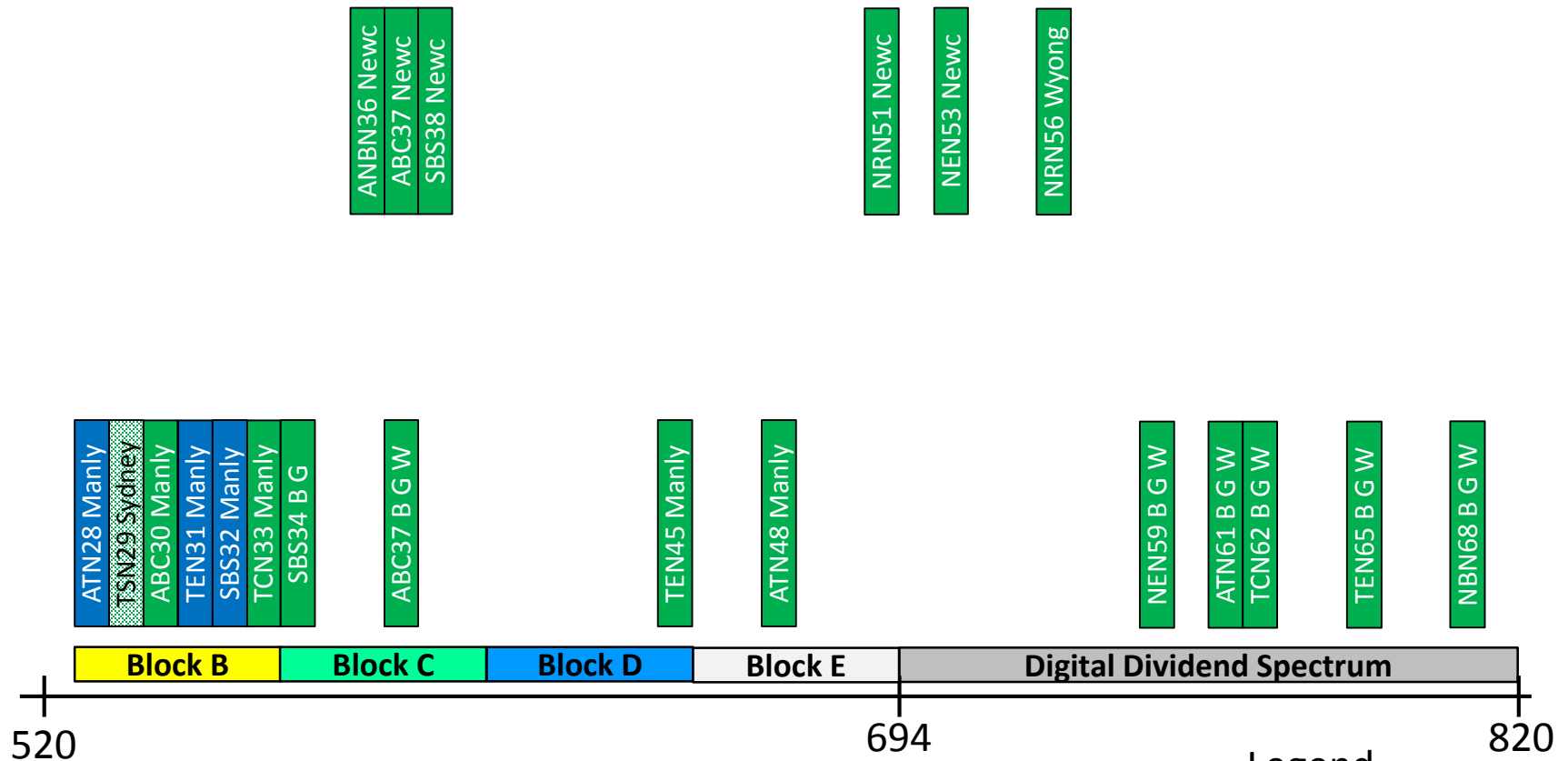
Legend



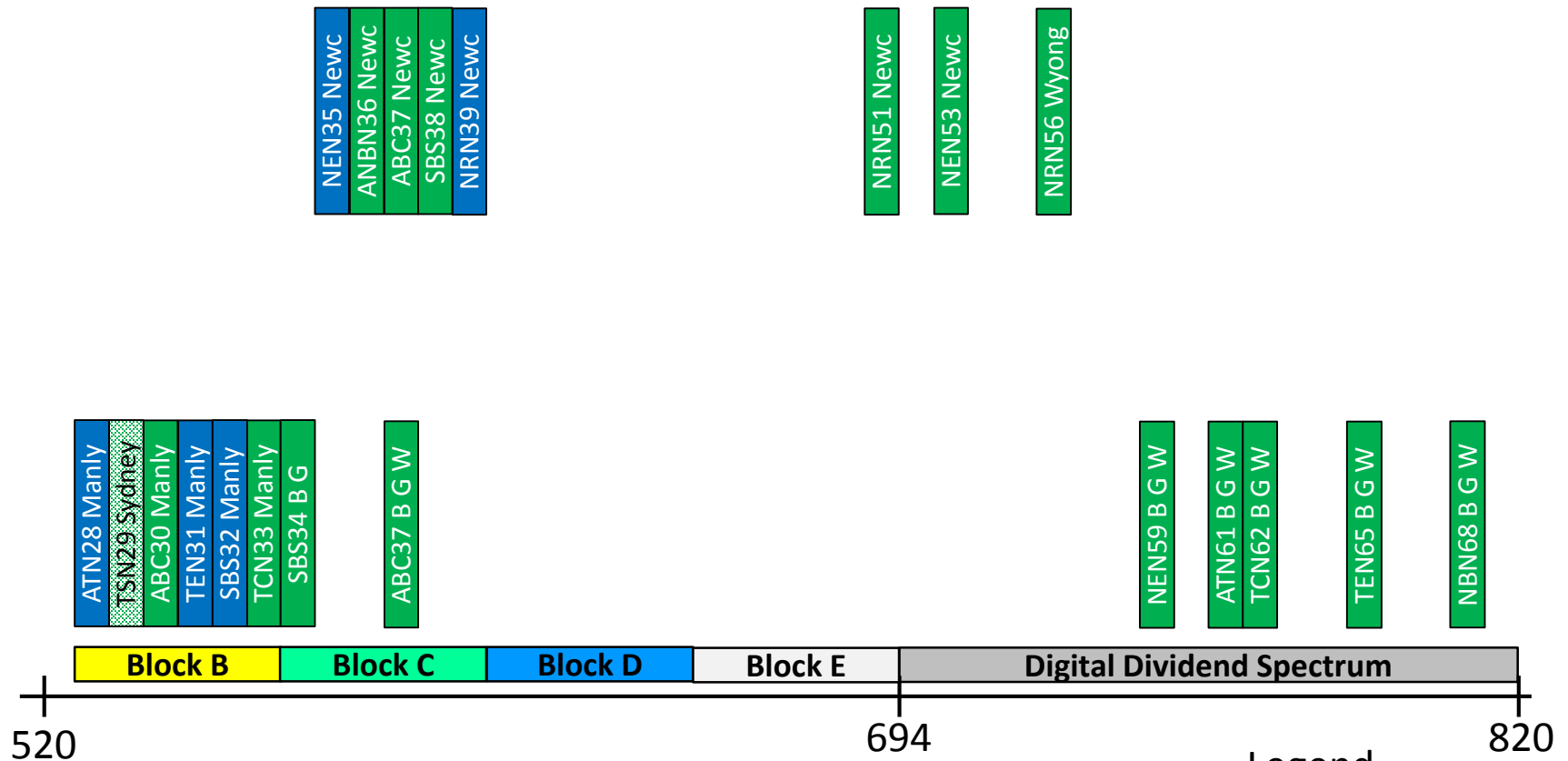
Digital

Restacked Digital

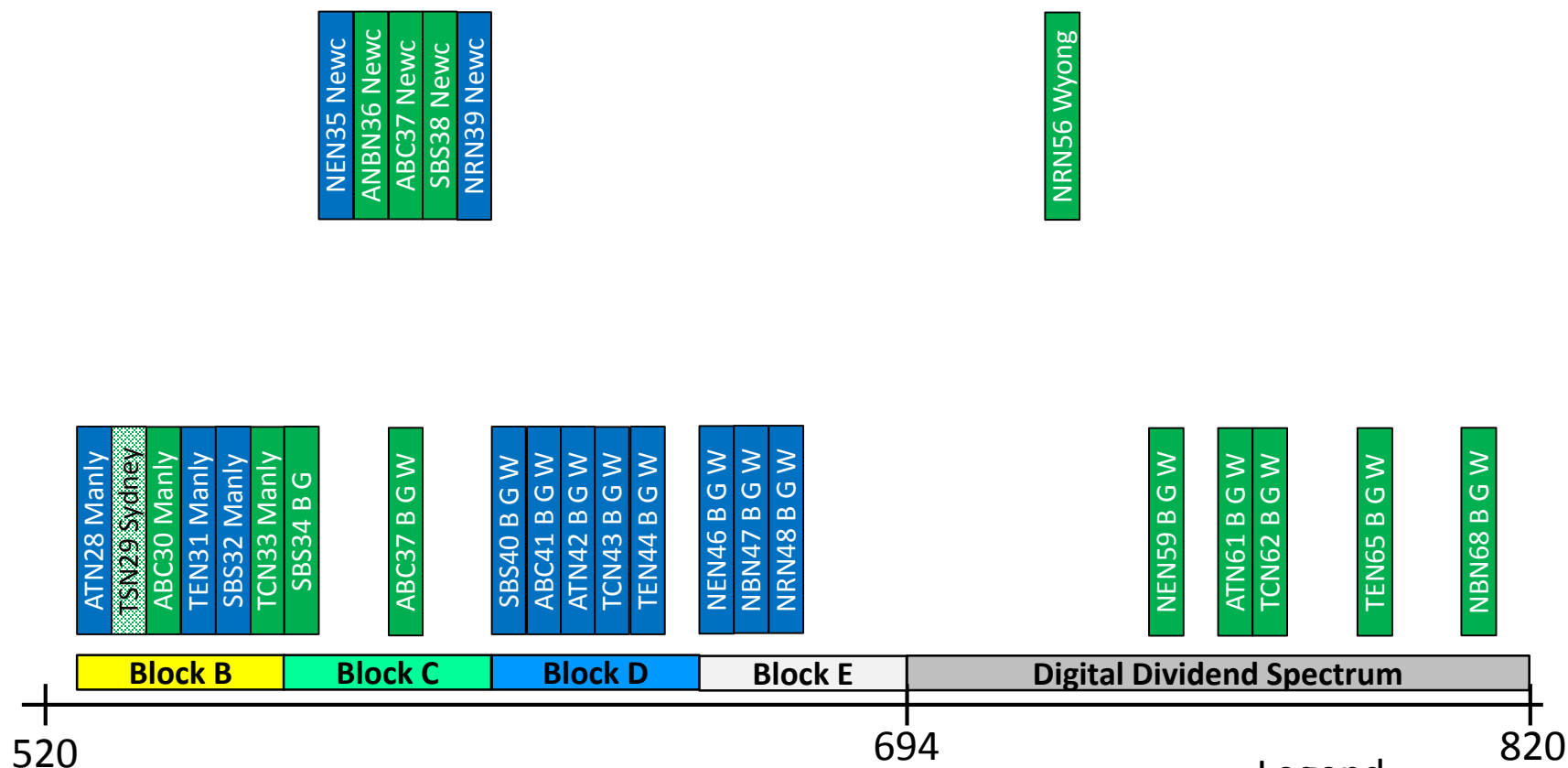
Post Sydney Simulcast



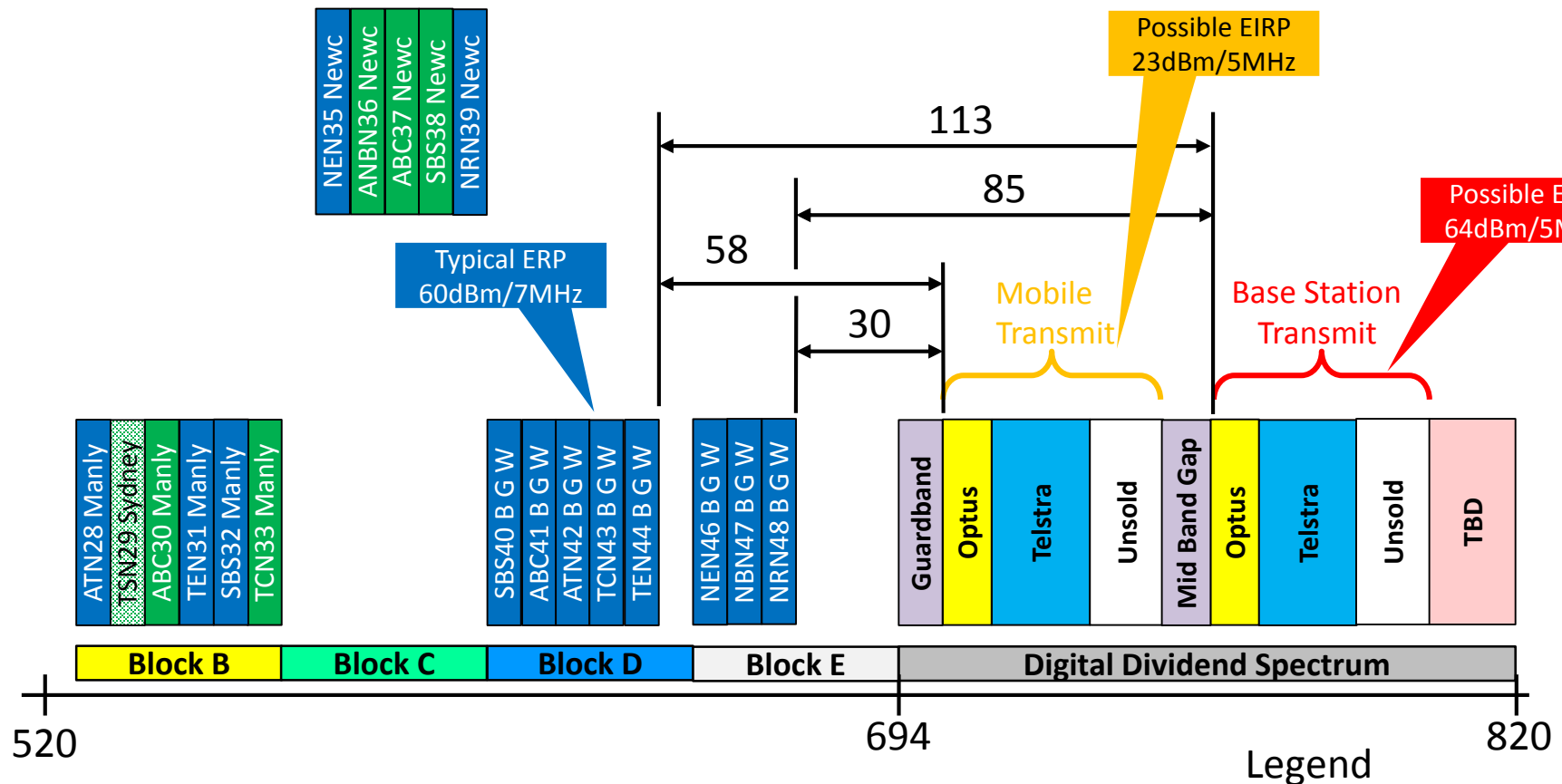
Newcastle Restack



Central Coast Restack



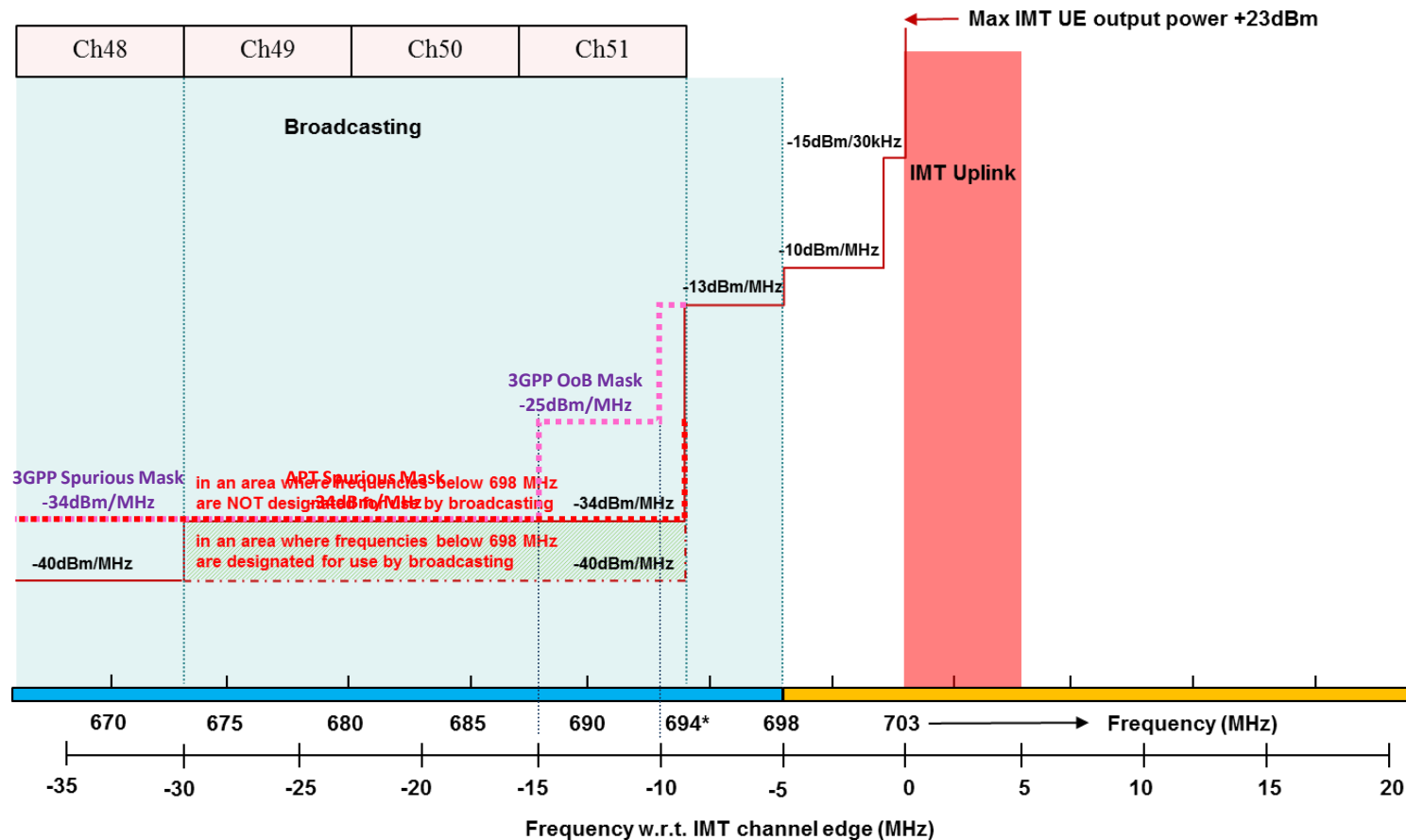
Spectrum Licences 1/1/15



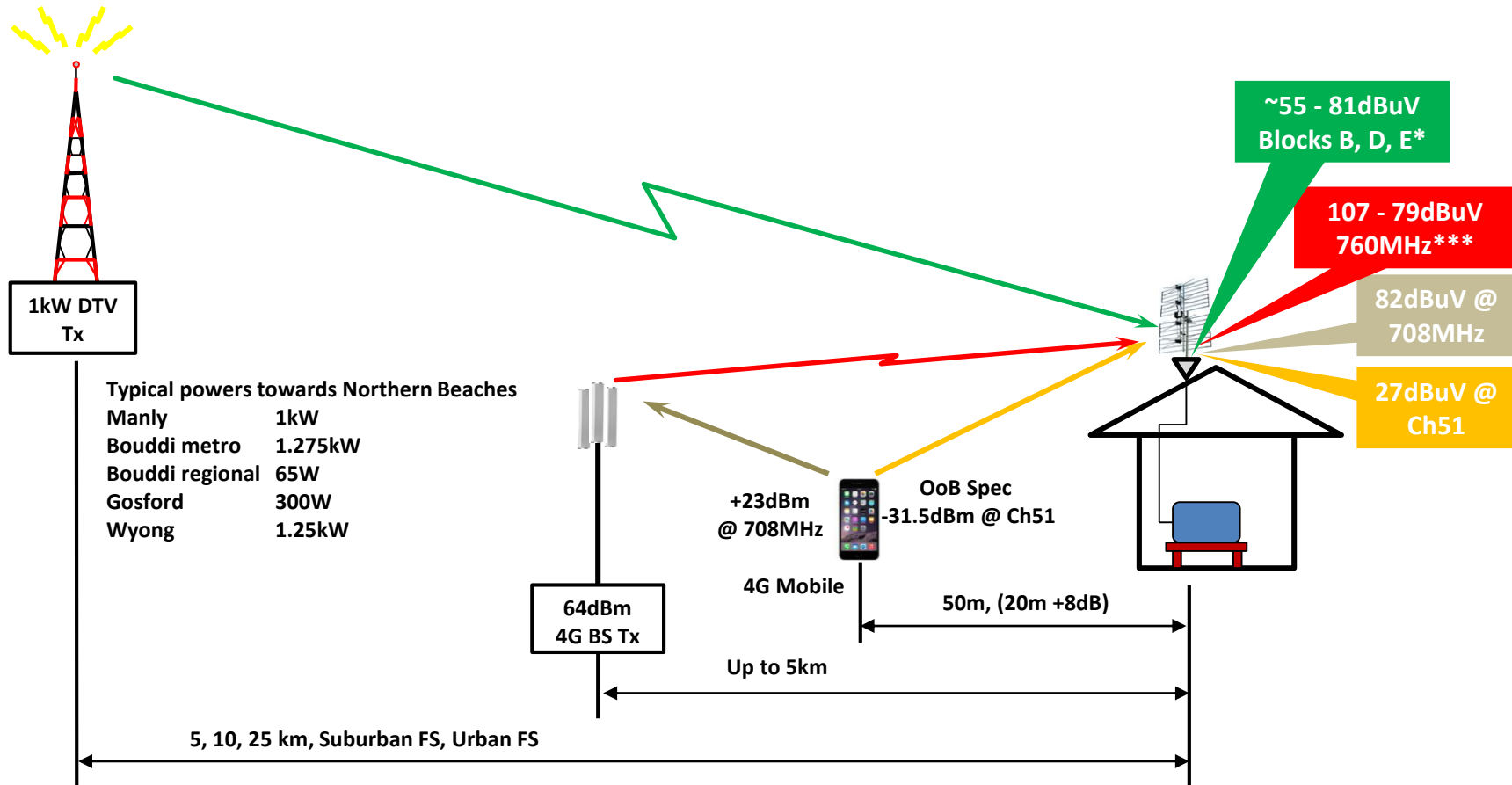
UHF Band Study post Digital Dividend

- Examined some typical Northern Beaches paths to translators
 - 5km North Head (Manly) to Brookvale / North Manly
 - 10km North Head to North Narrabeen; Bouddi to Palm Beach
 - 25km Bouddi to Collaroy; Gosford to Bayview
- Examined effect of being within 5km of an IMT (4G) base station
- Examined effect of localised interference from mobile handsets
- Interference mechanisms
 - IMT (4G) BS overloading masthead amps
 - IMT (4G) MS (mobile handset) overloading masthead amps
 - IMT (4G) MS Out-of-Band emissions degrading wanted DTV C/N

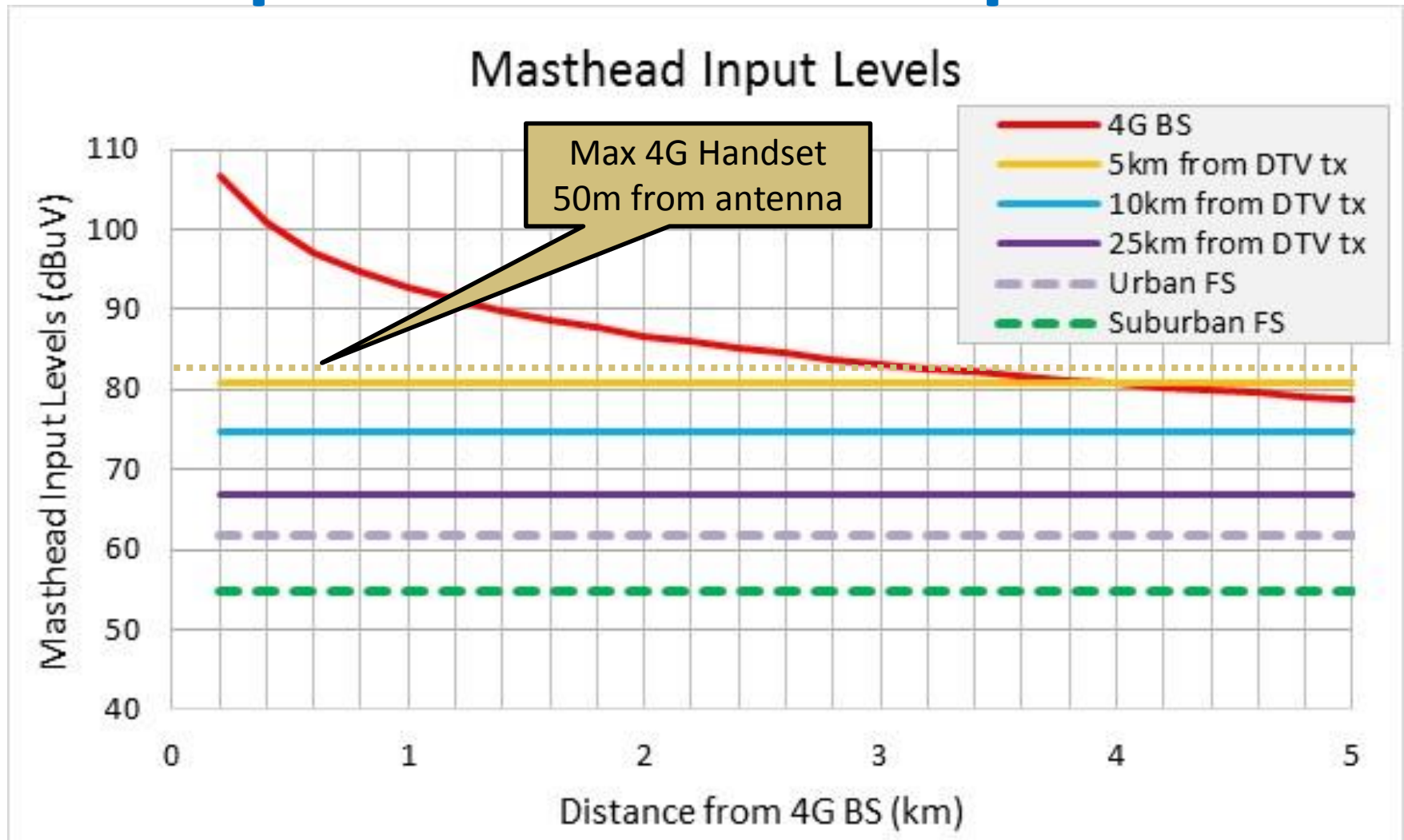
Adjacency to IMT (4G) in the APT 700MHz Plan



Typical New Scenario



Anticipated Masthead Input Levels

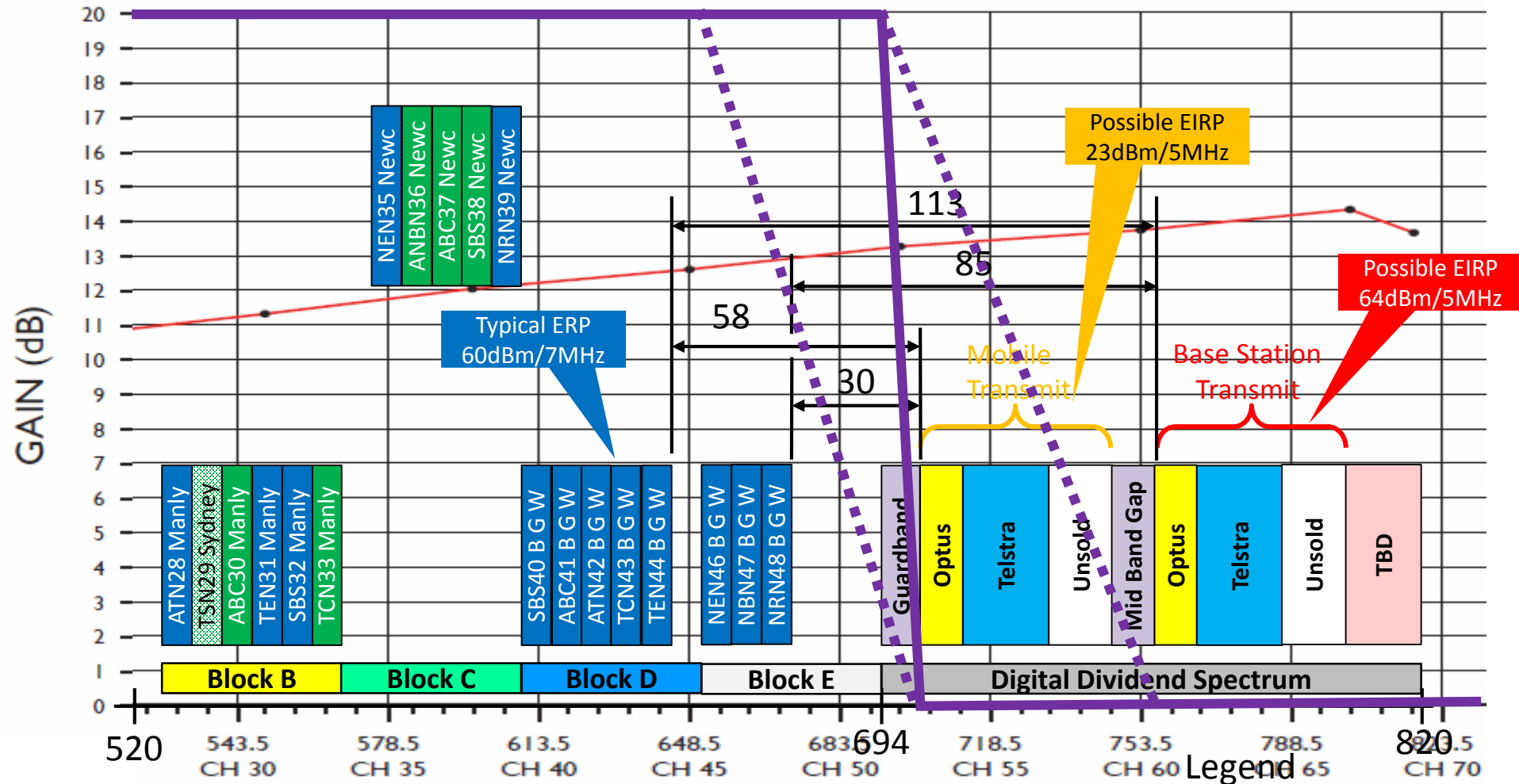


What Does Overload Do?

- Amplifier operates in a non-linear region
- Non-linear operation creates intermodulation distortion (IM)
- IM effectively reduces the wanted digital C/N (or MER) so pictures degrade

Antennas and Filters

UHF GAIN GRAPH



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Frequency (MHz)

Digital
Restacked Digital

ACMA Advice



Now's the time to get your antenna serviced

With the recent completion of the digital retune at the end of 2014, the major changes to TV spectra are now complete. Adequate TV coverage is almost universal, whether via terrestrial signals or satellite. A clear picture should be available in your area, so make sure your antenna isn't coming between you and good reception. Please visit www.acma.gov.au/tv/reception for more information.

If you're experiencing reception difficulties, chances are it's the antenna on your roof or the cables, connectors and equipment between the antenna and your TV. Most reception issues are caused by an inadequate antenna set-up, old or broken antennas and cabling, or inappropriate use of masthead amplifiers—so now's a good time to get your antenna serviced.

The first step is to get your TV antenna inspected to see if it's in good working order, optimised for your best available channels, up to the current digital TV standards or to identify if other issues are affecting your reception.

Do you need to use an antenna installer?

DIY antenna installers may not be aware of all aspects of digital TV and good TV reception, and can buy antennas, cables, connector and amplifiers that are not appropriate for good reception. Installation practices are also much more stringent with a digital TV setup than for analog TV.

Importantly, DIY installers need to be aware of the risks of climbing on roofs and working at heights.

You should seek the services of an experienced antenna installer to ensure that your receiving system is optimised for digital TV reception at your location. If it's not optimised, your system may deliver degraded reception quality or be susceptible to interference, resulting in poor reception. An experienced antenna installer can help to fix the common problems outlined in this fact sheet. The installer can test both the signal strength and quality of the signals to determine how reliable your reception is likely to be.

Reception issues that could be affecting inadequate or inappropriate antenna system

Issue: You've had reception difficulties ever since you started watching digital TV.

Possible causes:

- > Antenna not directed towards the best TV tower.
- > Low-performance antenna not suitable for your area.
- > Antenna not mounted high enough to clear obstructions.
- > Antenna not designed for, or located in, best possible current frequencies.
- > Broken, loose or corroded connections or components including damaged antenna elements.
- > Low-quality cable—use RG6 quad-shield coaxial cable.
- > You're using a masthead amplifier (signal booster) if not needed, is not designed for digital TV, is inappropriate set up or does not include a 4G filter.

Possible fixes:

- > Get your antenna checked by an antenna installer to minimise the possibility of reception difficulties.
- > Check out the mySwitch website (<http://myswitch.digitalready.gov.au>) for information on the best TV signals for your location, including signal level, frequencies and the best TV tower at which to point antenna.

Overload from 4G mobile broadband base stations

Mobile carriers started rolling out their 4G networks in late 2014 and accelerated the rollout from 1 January 2015 when spectrum previously used for TV broadcasting became more widely available.

Reception problems can occur when masthead amplifiers pick up strong signals and are overloaded from frequencies outside of those designated for current TV broadcasting. This is only likely to occur for households that are within 1 km of a base station providing 4G mobile services, have a masthead or distribution amplifier, and the TV antenna has a direct line of sight to the mobile base station.

If you're affected by amplifier overload, you'll most likely have no TV reception at all or may experience pixelation on all channels. Your immediate neighbours may also be affected if they also have a masthead or distribution amplifier.

Possible fixes that an antenna installer can implement:

- > Installing a 4G filter at the input to the existing masthead amplifier or replacing the antenna with one that has a 4G filter built-in.
- > Removing the masthead amplifier altogether or replacing it with one that has a 4G filter built-in.

You may need to contact your antenna installer to implement one of these fixes, as installation and maintenance of appropriate reception equipment is your responsibility. The ACMA has no authority under the *Radiocommunications Act 1992* to require mobile carriers to compensate affected viewers whose systems are susceptible to masthead amplifier overload from 4G services.

Antenna
Installation
and
Maintenance
Fact Sheet

ACMA

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New frontiers in television

The switch to digital TV has given us an array of new channels to enjoy. It has also led to a reshuffle of channels, as the top end of the TV spectrum was vacated.

Households can now use a much simplified antenna system—a single VHF or UHF-only antenna—to make reception more consistent and reliable. This means you can either remove the unused antenna or upgrade to a single-band high-gain antenna to achieve better performance, if required.

The TV spectrum vacated as part of these changes has enabled the latest technology—4G mobile broadband services—to be deployed in the 700 MHz band. The mobile carriers are rapidly rolling out these mobile broadband networks, greatly improving the mobile data capabilities in both metropolitan and regional Australia.

8.11

Communications
and Media
Authority

Lessons For Pacific Nations

Australian Experience	Pacific Nation Lesson
Broadcast Spectrum Congestion	Spectrum Congestion generally not an issue
4G Introduction needs filtering	Lower use of masthead amplifiers, television front end overload possible, Wanted / Unwanted likely to be greater so filtering may be needed. Refrain where possible from using top channels to make a “guardband” and keep adjacent services as far away as possible.
Ducting more evident	Avoid channel re-use wherever possible to avoid ducting
How to transition to next broadcasting technology without spectrum	Should not be an issue but may require band change in some instances which would be disruptive and costly to viewers

Thank You for your attention



Questions?