Spectrum Usage and User Requirements for Terrestrial Electronic News Gathering, Television Outside Broadcasts and Electronic Field Production in Australia

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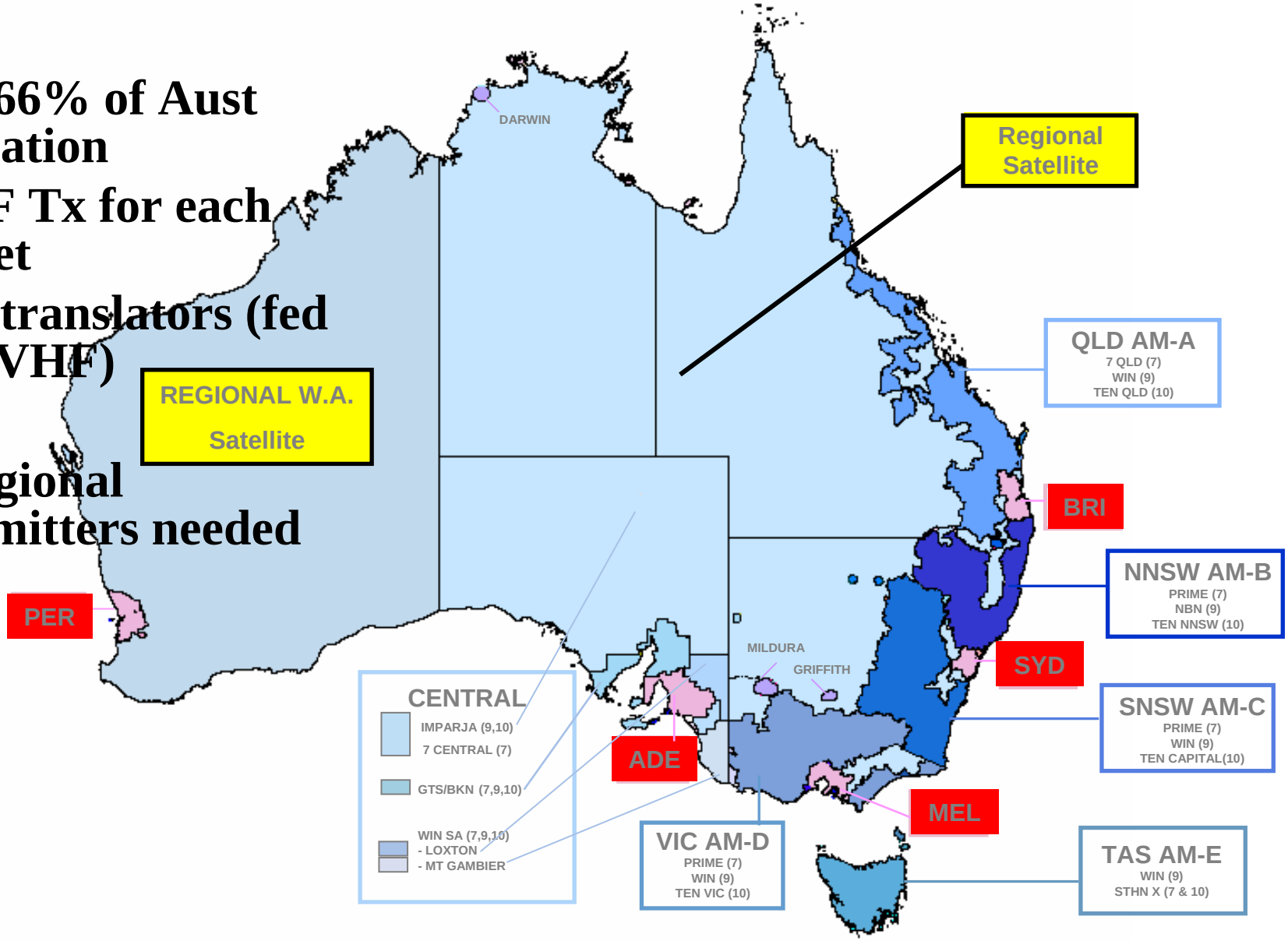
Broadcaster Outline

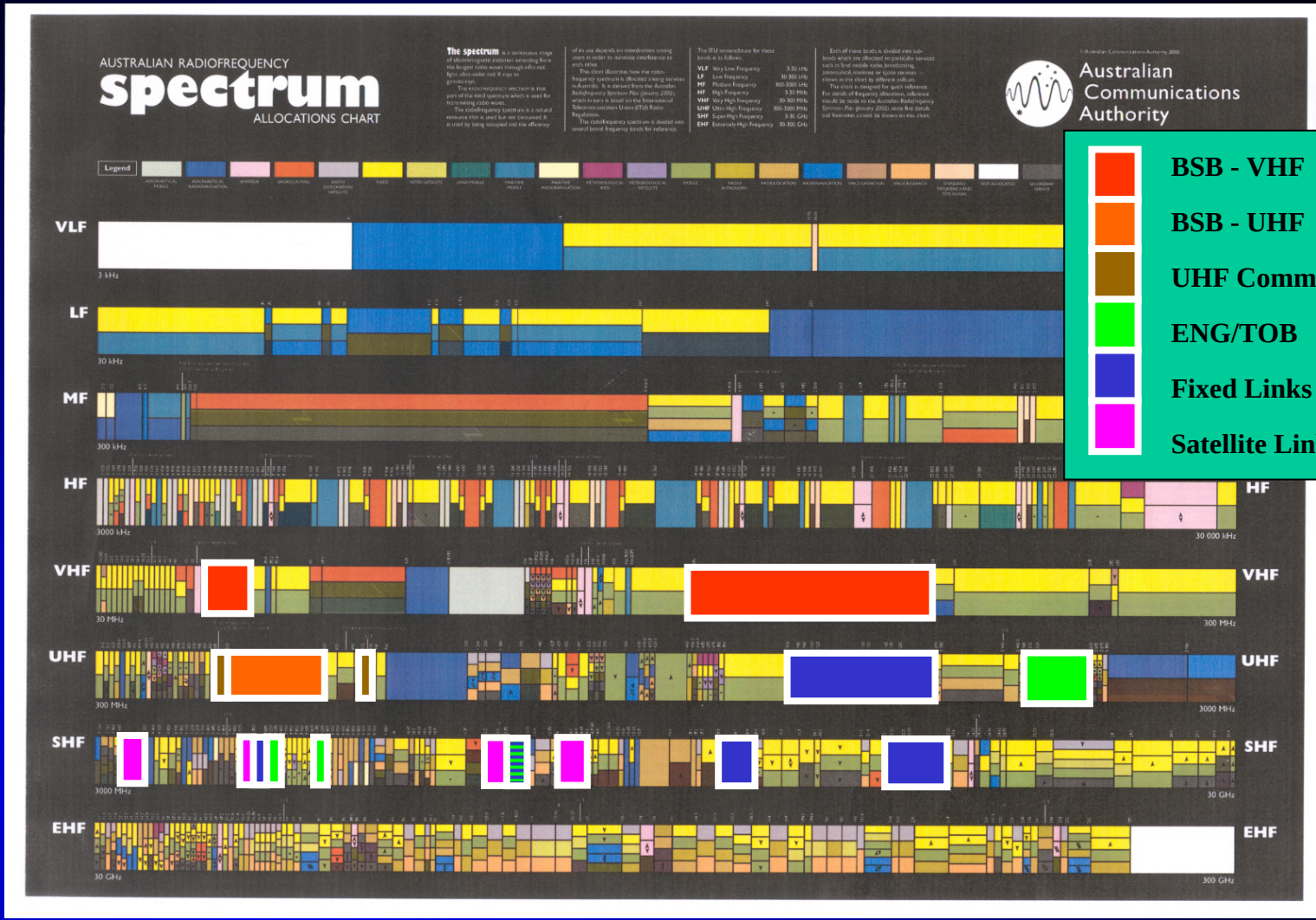
- Free to Air (Terrestrial)
  - 2 national networks (govt owned)
    - ABC, SBS
  - 3 commercial operators in each market
    - 7, 9, 10 Networks (capital cities) and their regional affiliates
  - Remote markets 2 operators
    - Satellite DTH and terrestrial
- **ABC, 7, 9,10 Networks hold nation-wide licences for ENG/OB**

Broadcaster Coverage

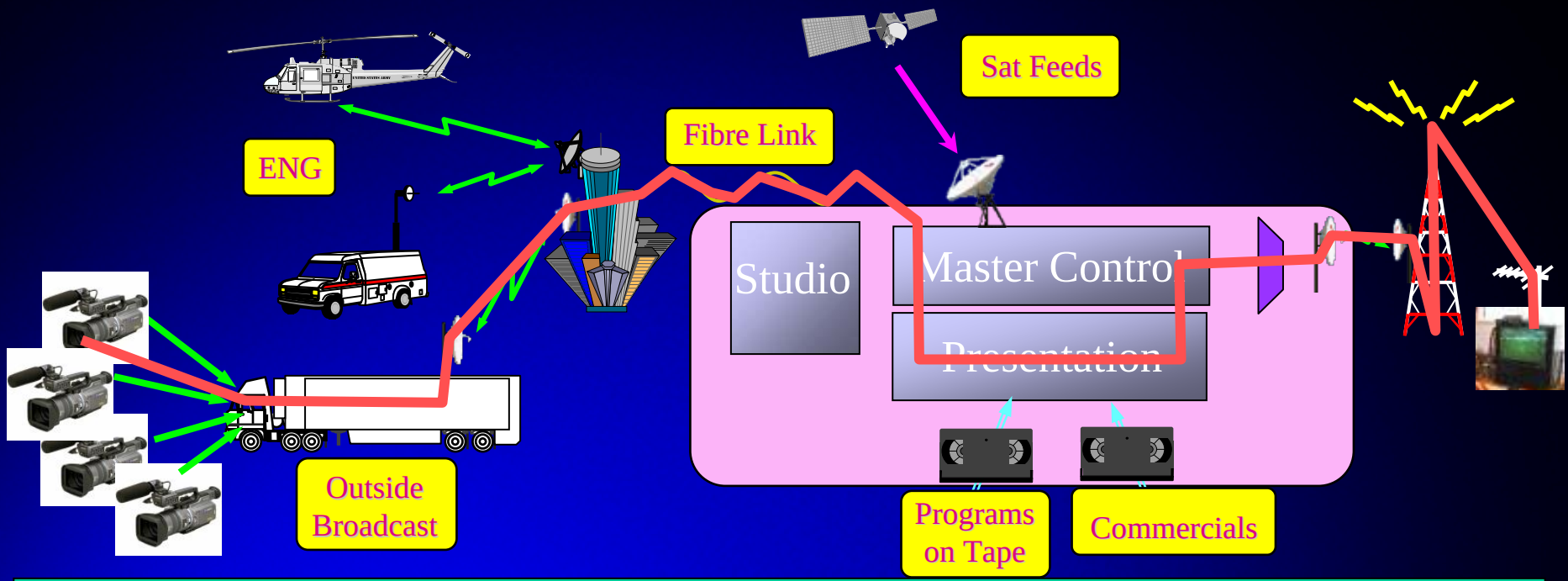
- 5 Cities 66% of Aust Population
- 1+1 VHF Tx for each market
- 20 UHF translators (fed from VHF)
- 220+ Regional transmitters needed

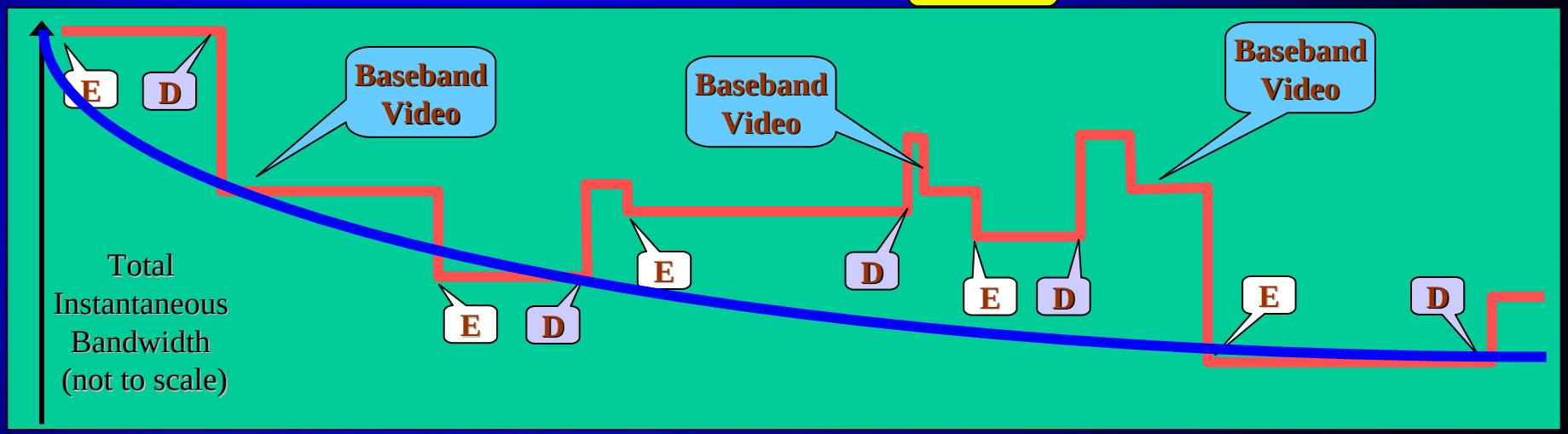


Broadcaster's Use of Spectrum



The Television Production Process





Video Compression

- Compression reduces bandwidth
- BUT loses information
- ADDS artefacts
- CREATES concatenation problems
  - We often have five sequential encode – decode sectors between the camera and the viewer

User Requirements

- Wireless Cameras
- Radio Microphones
- Order Wires (Production Control)
- Data Circuits
- Transmission Links
- Broadcast

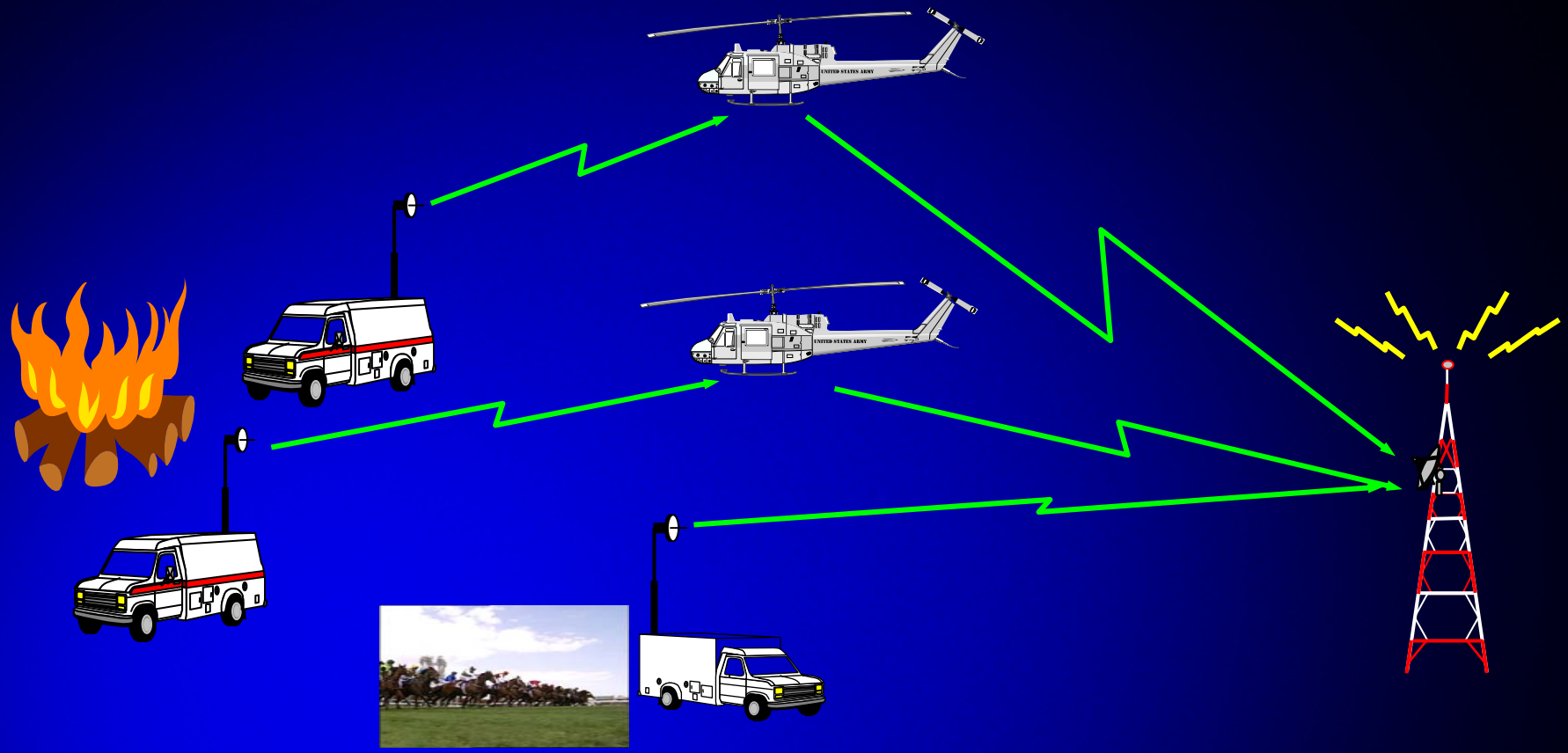
Electronic News Gathering

- Primarily covering news events
  - Broadcaster has no control over location or timing of event
  - Usually several broadcasters competitively cover the same event
  - Often ENG provides vital information for disaster relief in emergencies
- Operational Characteristics
  - Rapid response
  - Unplanned deployment
  - Generally short deployments
  - Live-to-air and live-to-studio for program compilation
  - OH&S considerations
- Spectrum Characteristics
  - Must work on obstructed paths
  - Must allow for long and short links
  - Must allow signals from any location
  - Maximise immediacy and reliability of signal transmission
  - Allow broadcasters to operate in contiguous channels
  - Available for immediate and unrestricted use at all times

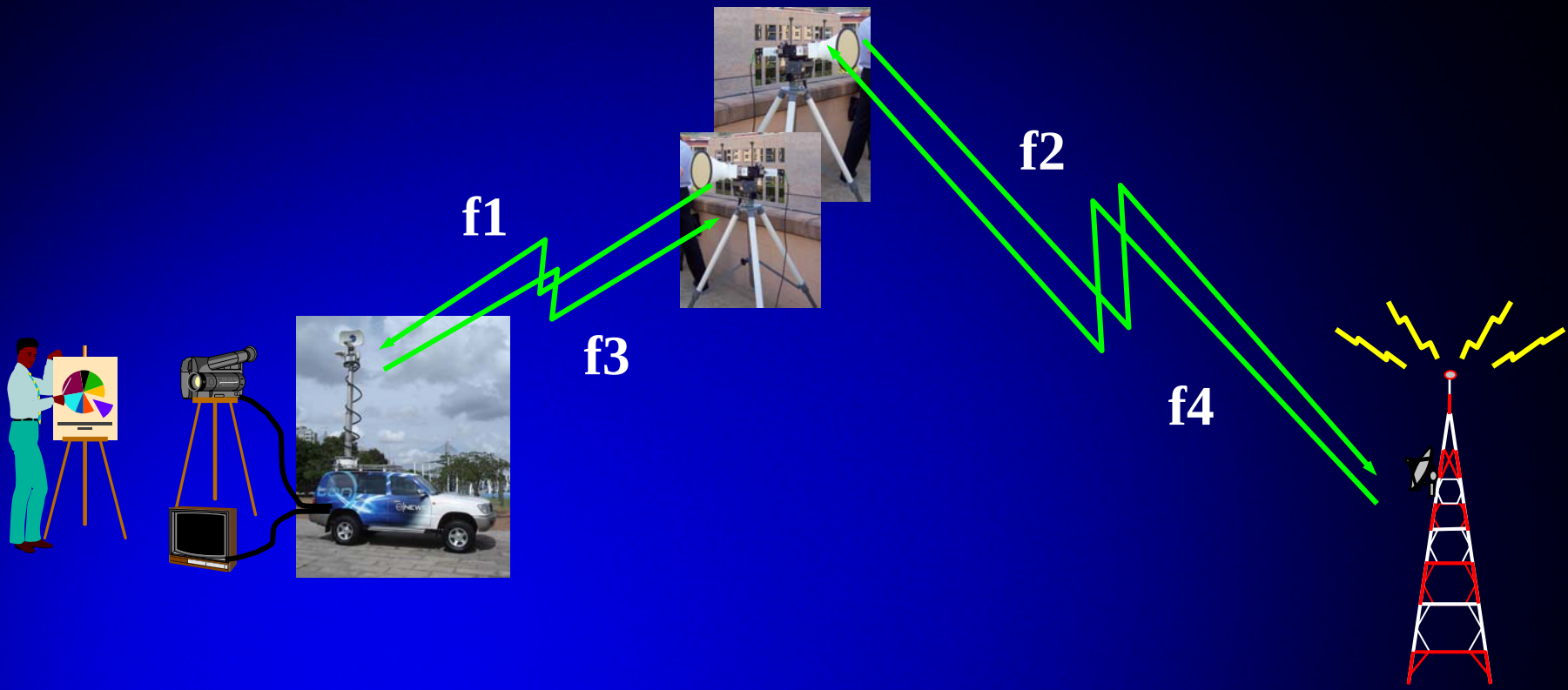
Equipment

- Wireless Cameras
- ENG vehicles
- Helicopter platforms (camera and relay)
- Portable Links
- Central Collection Sites

ENG - Covering A Major News Story

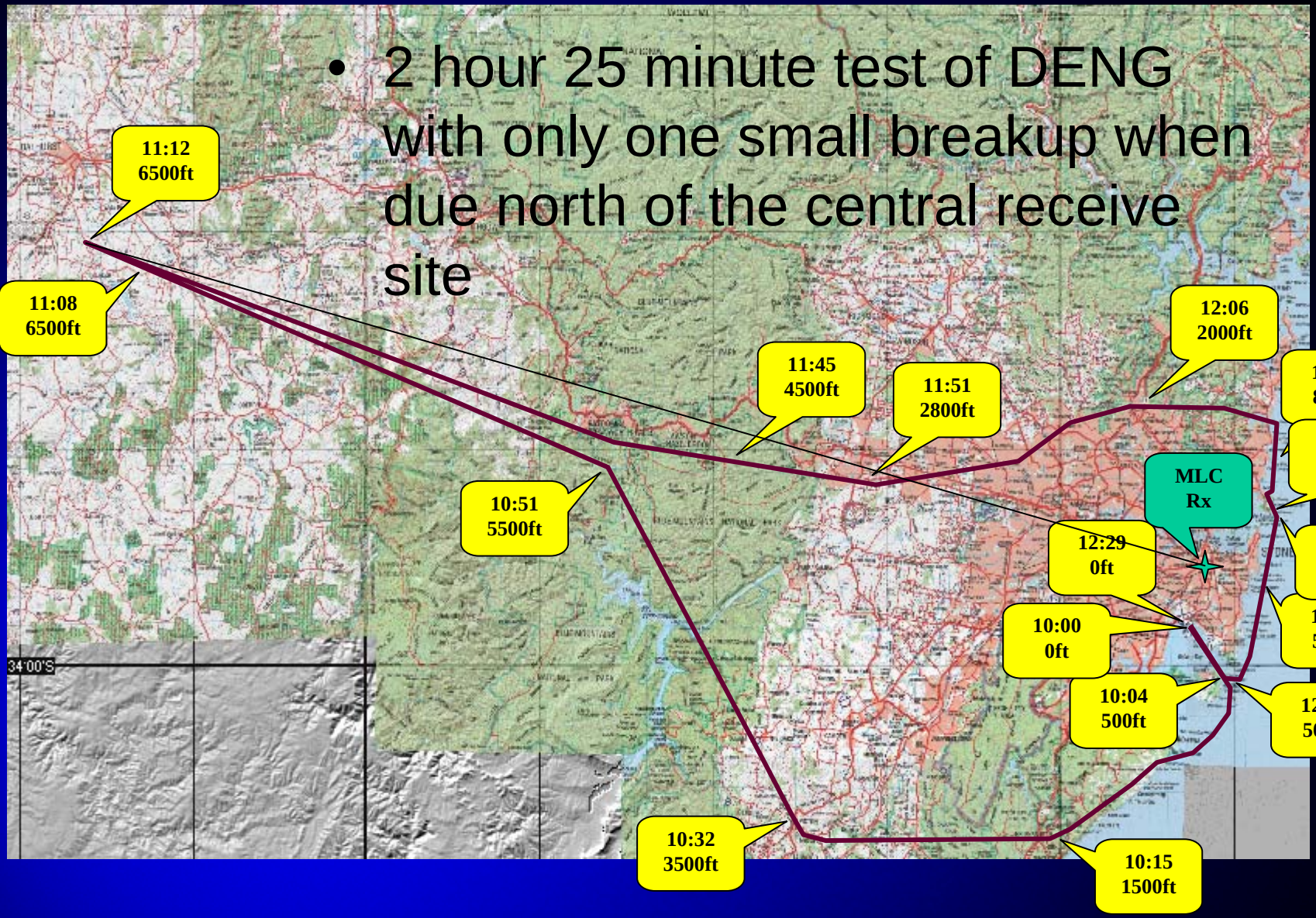


ENG - Two Way Interview

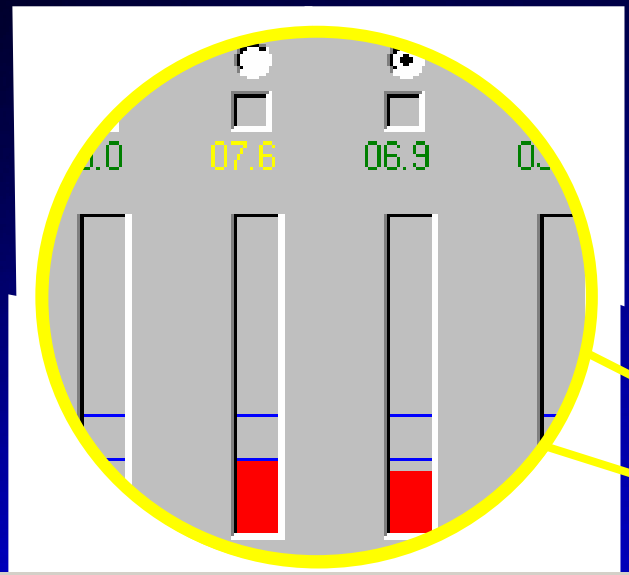


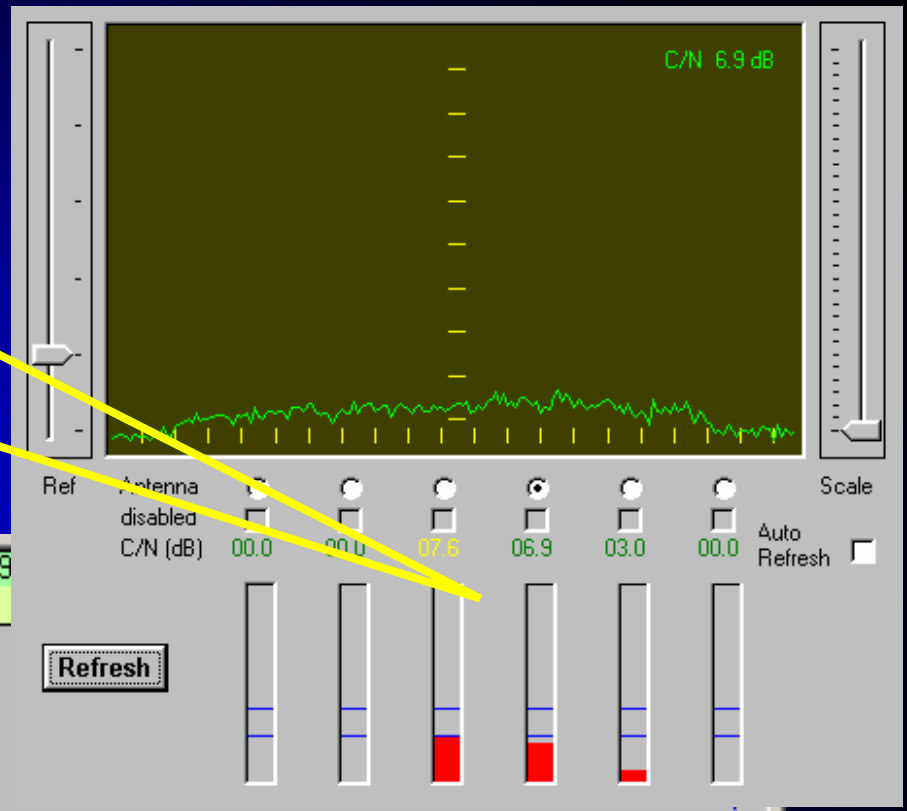
DENG Helicopter Test

- 2 hour 25 minute test of DENG with only one small breakup when due north of the central receive site



Bathurst –154km

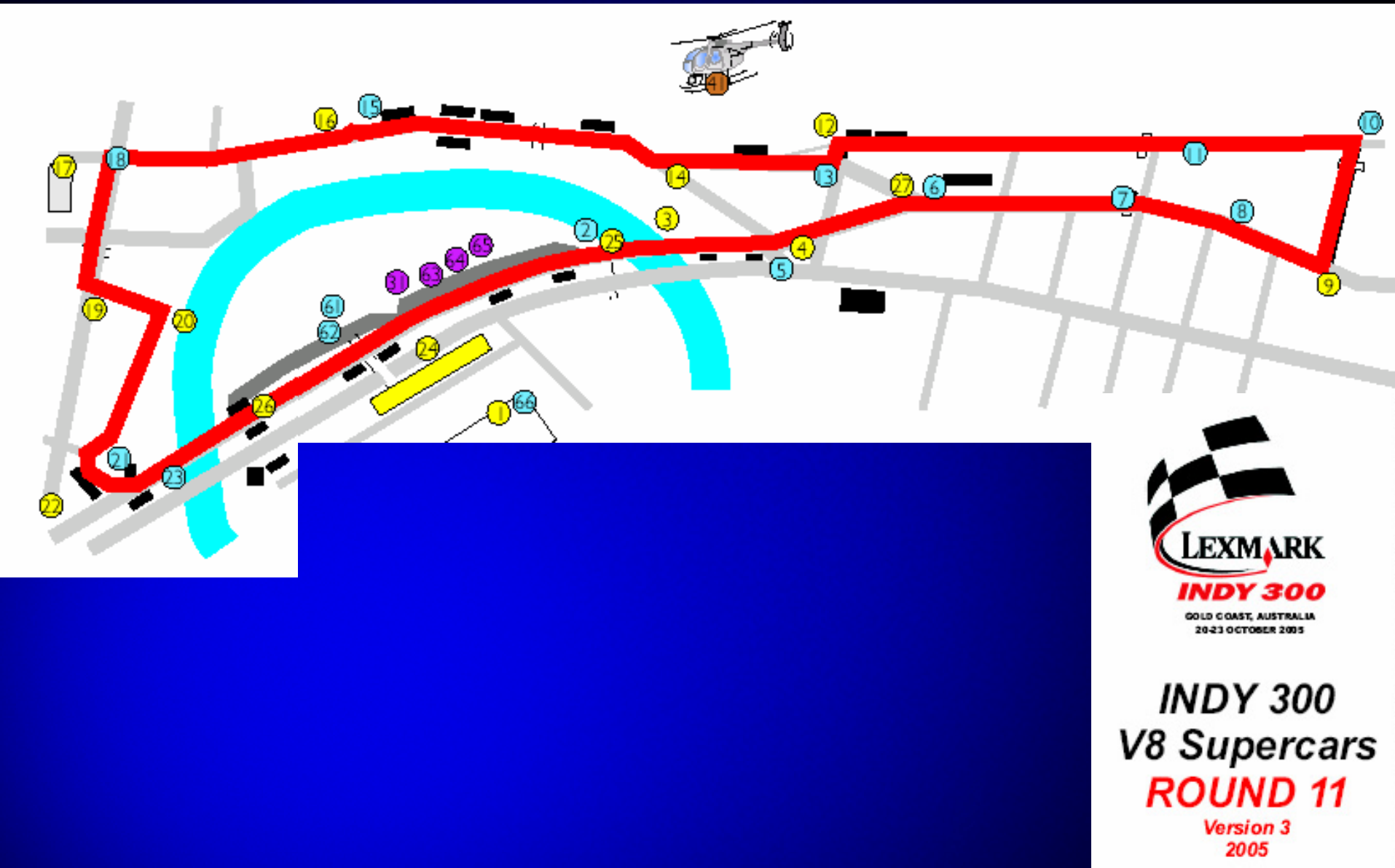




Outside Broadcast

- Coverage of
  - major sporting events
  - concerts, street parades, nationally significant events, etc
- Operational Characteristics
  - Planned deployment
  - Often require multiple links (wider bandwidth required)
  - Deployments may be from a day to weeks
  - Live-to-air and rehearsals/pre-records
  - OH&S considerations
- Spectrum Characteristics
  - Camera–related spectrum
    - Must work on obstructed paths
    - Allow for rapidly varying paths
    - Allow for rapidly moving transmitters
    - Work for airborne platforms
  - Link-related spectrum
    - Must allow for long and short links
    - Must allow signals from any location
    - Maximise reliability of signal transmission

Indy 300 / V8 Supercars Round 11



LEXMARK
INDY 300
GOLD COAST, AUSTRALIA
20-23 OCTOBER 2005

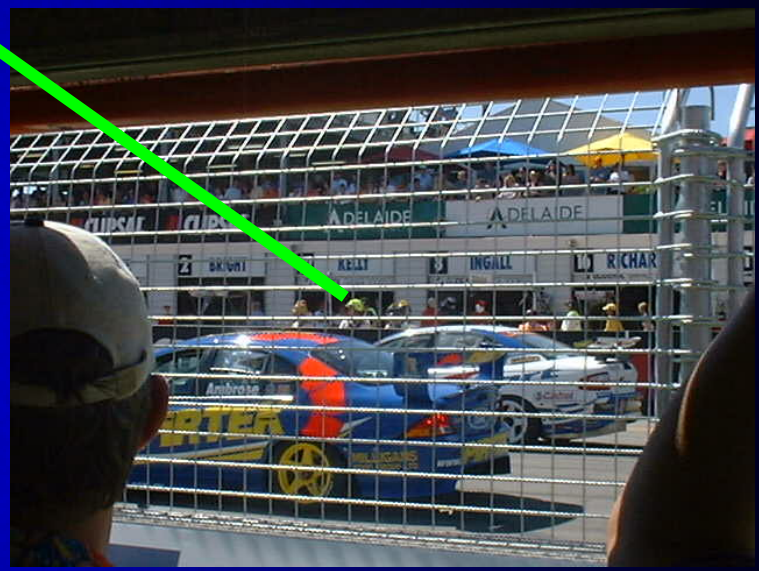
INDY 300
V8 Supercars
ROUND 11
Version 3
2005

Indy 300 / V8 Supercars Round 11

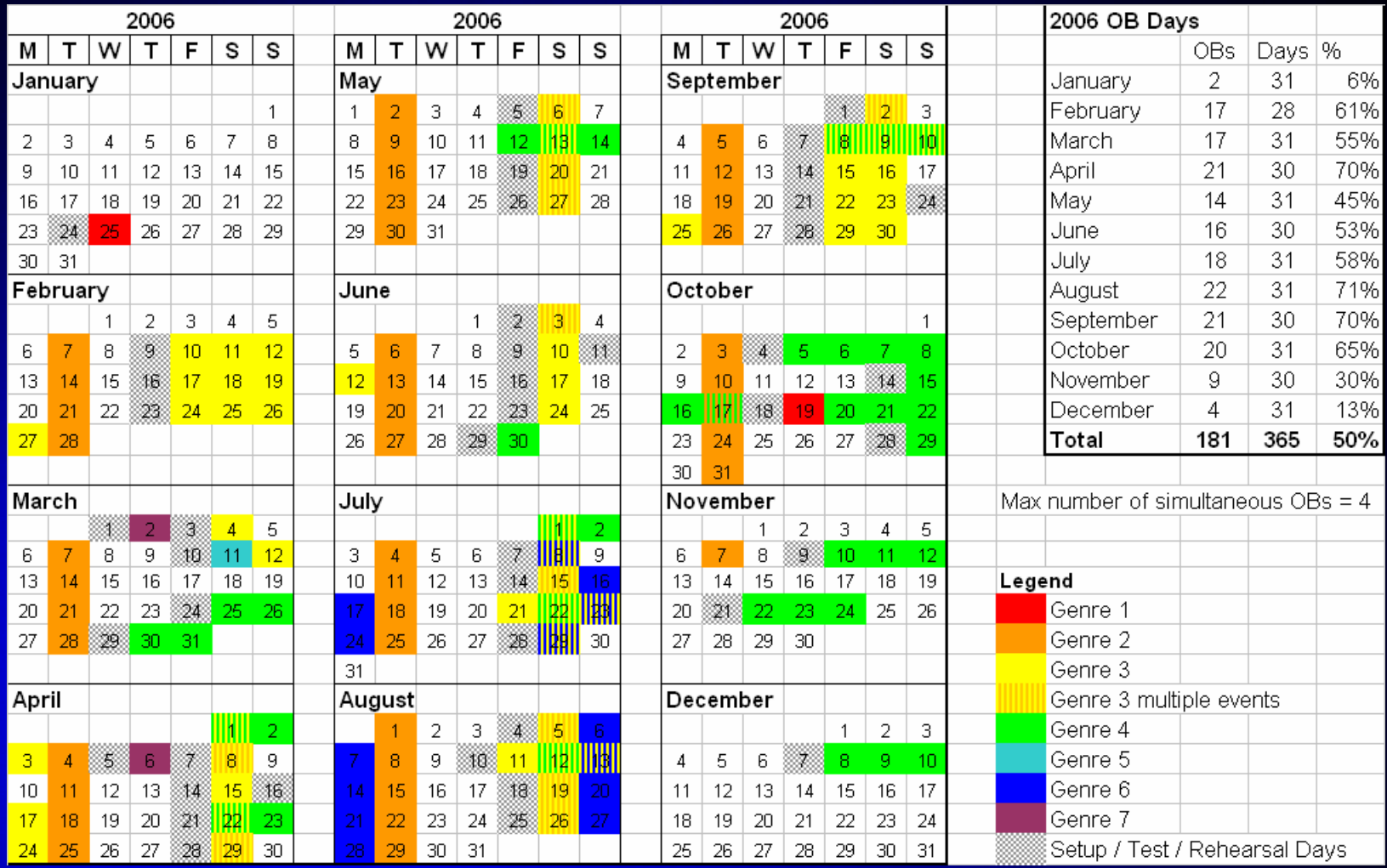
- 31 cameras (cabled)
- 1 Satellite Uplink (Optus)
- >10 x UHF Comms Channels
- Wireless Camera Links
  - 6 Pitcam digital camera links
  - >8 V8 incar analog uplinks
    - switched on 6 frequencies
  - 1 multiplexed V8 incar digital downlink
  - >4 CHAMP car analog uplinks
    - switched on best 3 of 4 frequencies
  - 4 CHAMP car analog downlinks
  - 1 Flycam
  - 1 Helicopter camera
  - ***Used 364MHz spectrum***
  - ***required re-use of several frequencies and co-ordination with network and other broadcaster ENG needs***

Helicopter Relay / Incar

Pit Cams



Ten's OB Schedule



Electronic Field Production

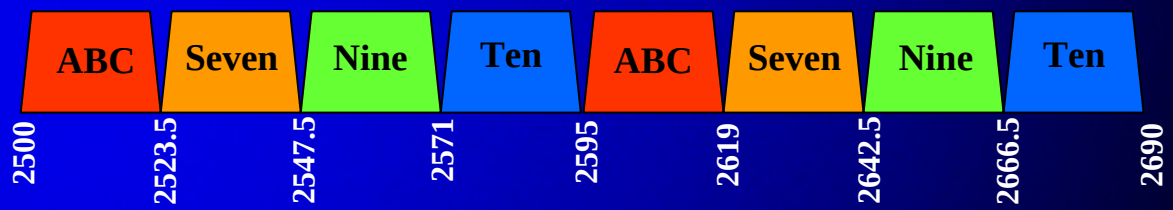
- Wide range of applications
- Characteristics
  - Planned deployment
  - More elaborate television production values
  - Deployments may be from a day to weeks
  - Live-to-air and recorded for later production/broadcast

Bands Used for ENG & OB

- 2 500 – 2690 MHz
- 7 100 – 7450 MHz
- 12 7590 – 13 250 MHz

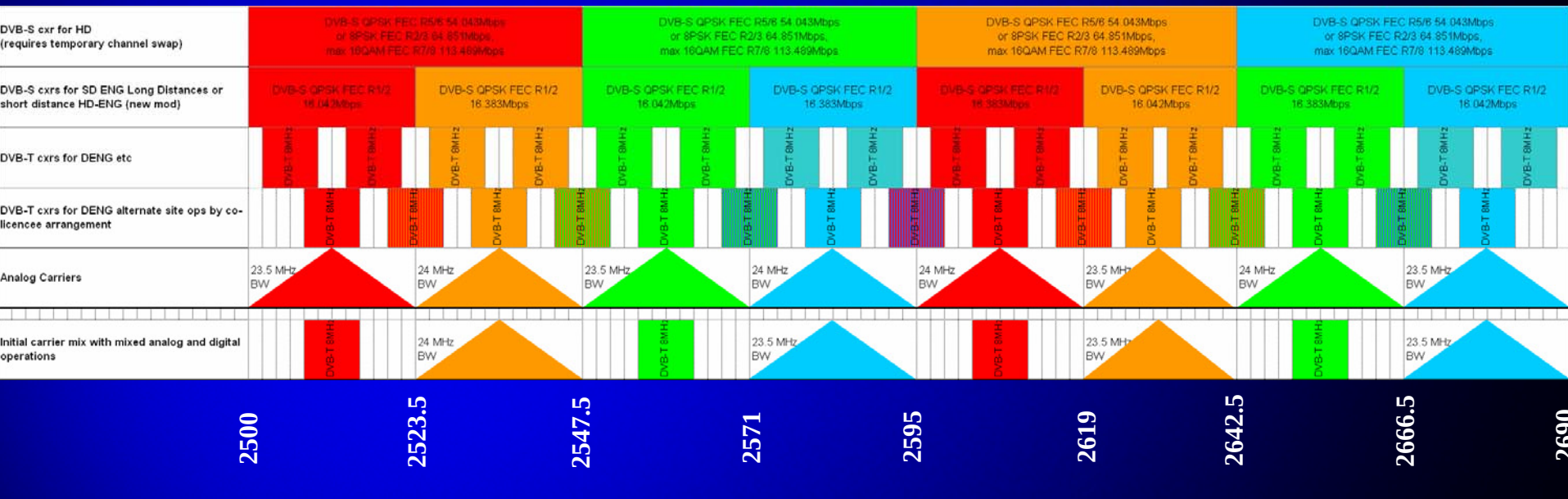
2.5GHz Band

- Four broadcasters each have a 23.5MHz and 24MHz allocation
- Networks are converting ENG to digital
  - ABC, Nine implemented digital nationwide
  - Ten a mix of analog and digital
  - Seven mainly analog



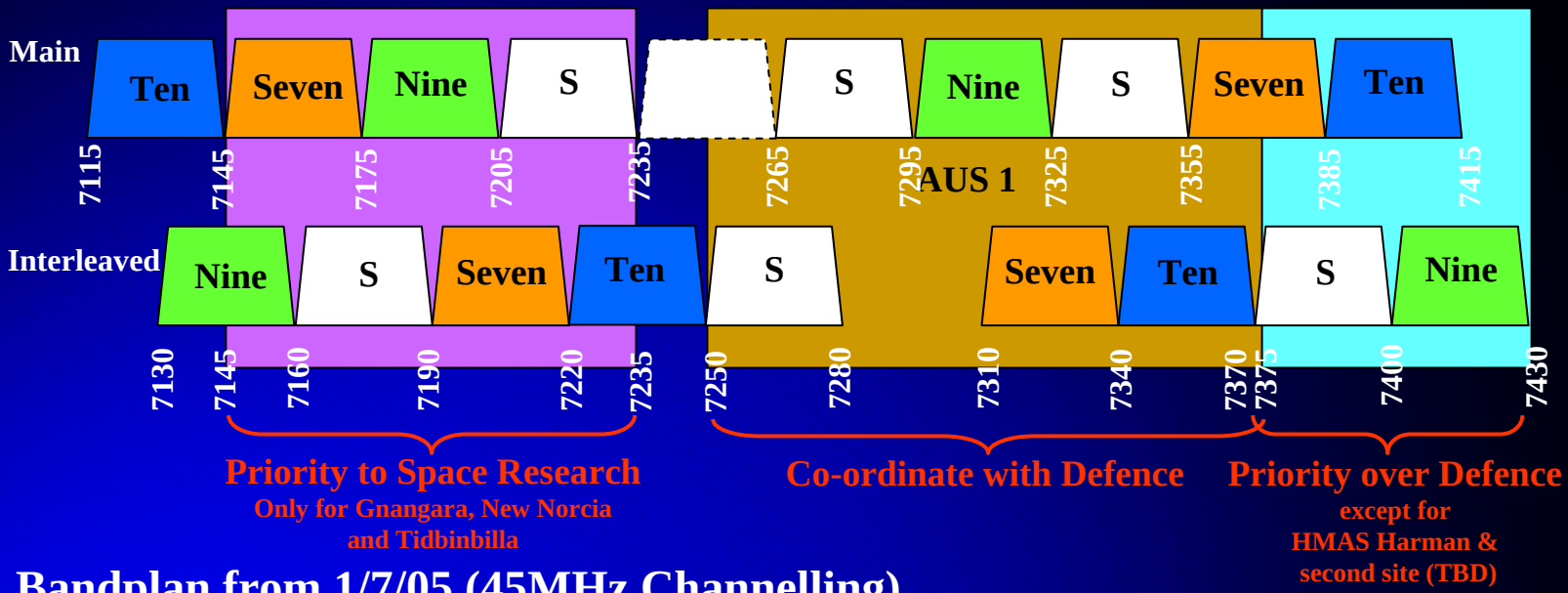
2.5 GHz A to D Transition Plan

- Options
  - Analog
  - Interleaved Analog and Digital
  - SD DVB-T with 4MHz guardbands
  - Aggregated channels for HD in the future

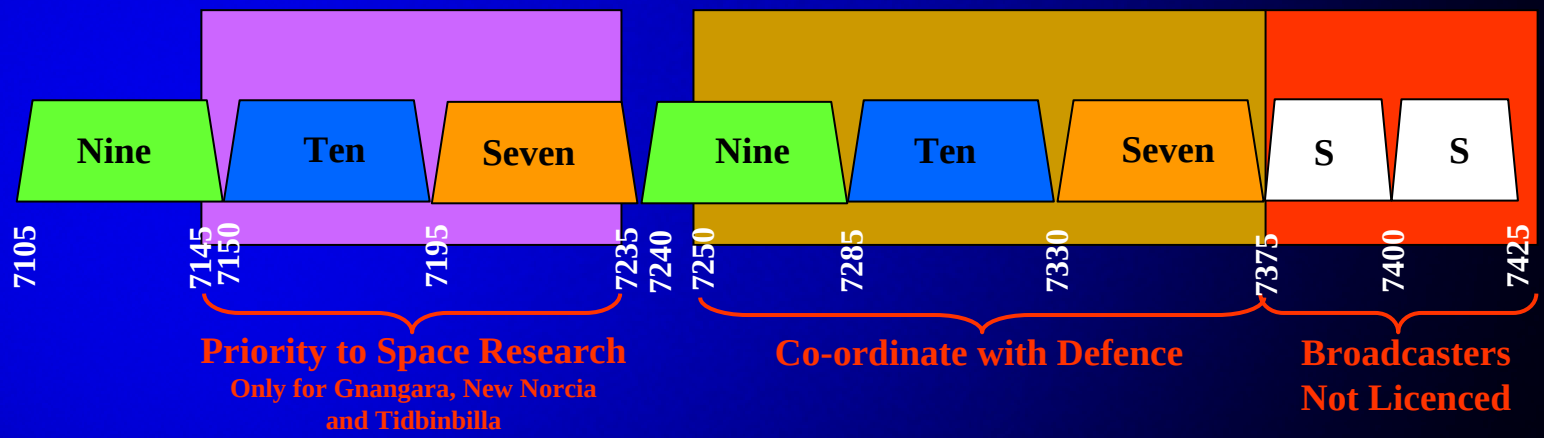


7.2GHz Band

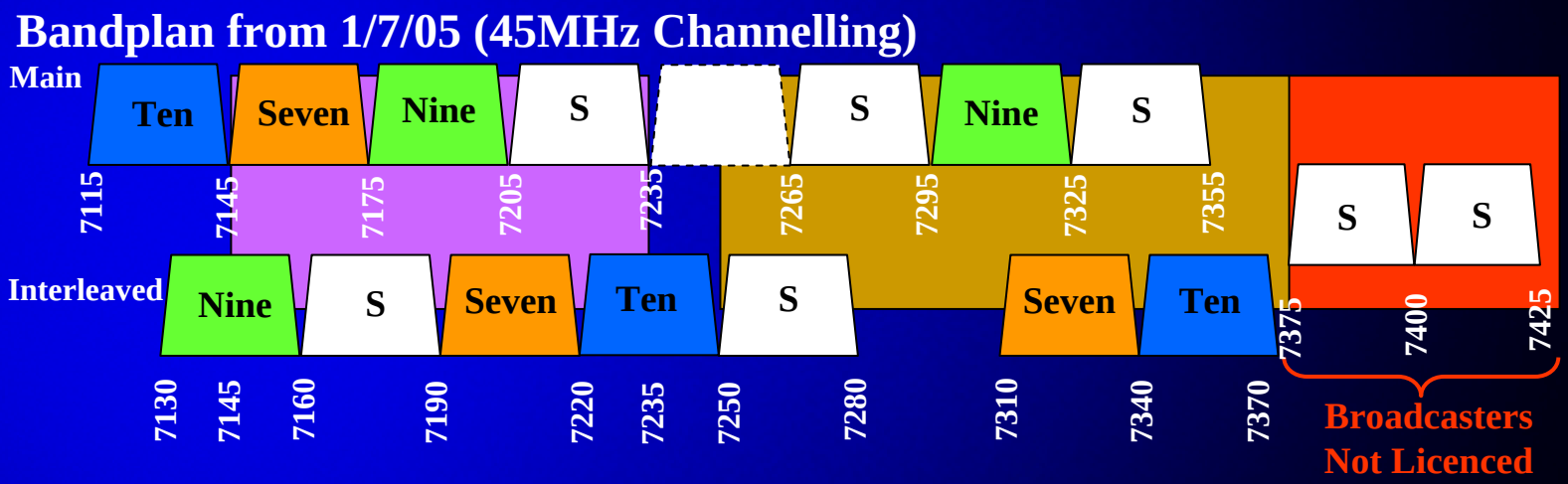
Bandplan to 30/6/05 (30MHz Channelling)



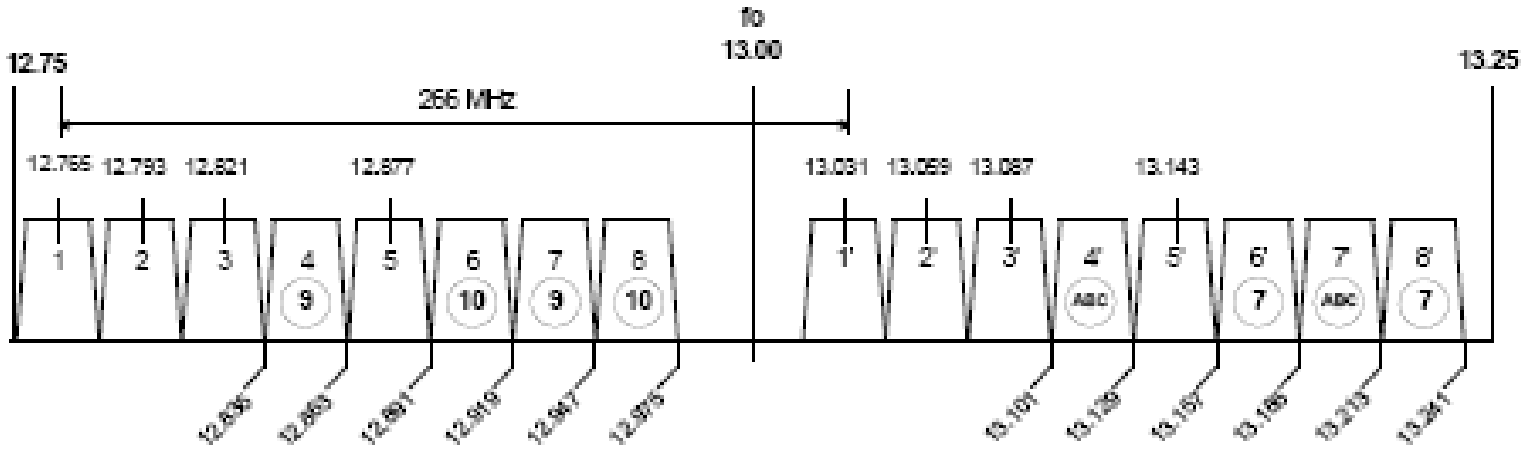
Bandplan from 1/7/05 (45MHz Channelling)



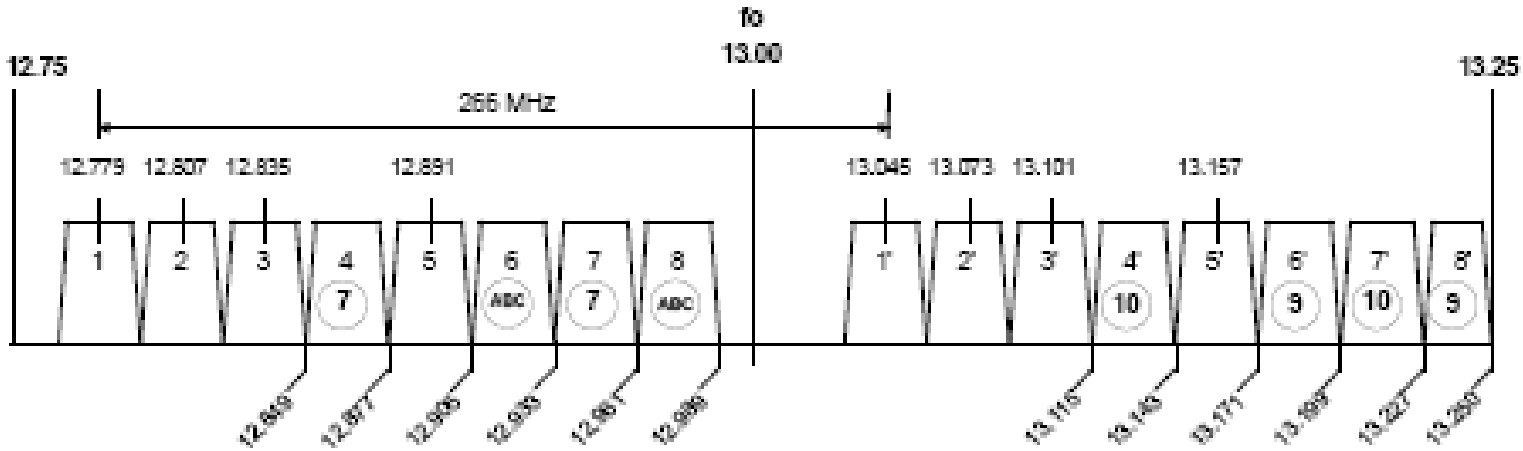
7.2GHz Band


Bandplan from 1/7/05 (45MHz Channelling)
Main
Ten
Seven
Nine
S
S
Nine
S
S
S
7115
7145
7175
7205
7235
7265
7295
7325
7355
Interleaved
Nine
S
Seven
Ten
S
Seven
Ten
7130
7145
7160
7190
7220
7235
7250
7280
7310
7340
7370
7375
7400
7425
Broadcasters
Not Licenced

13GHz Band



MAIN

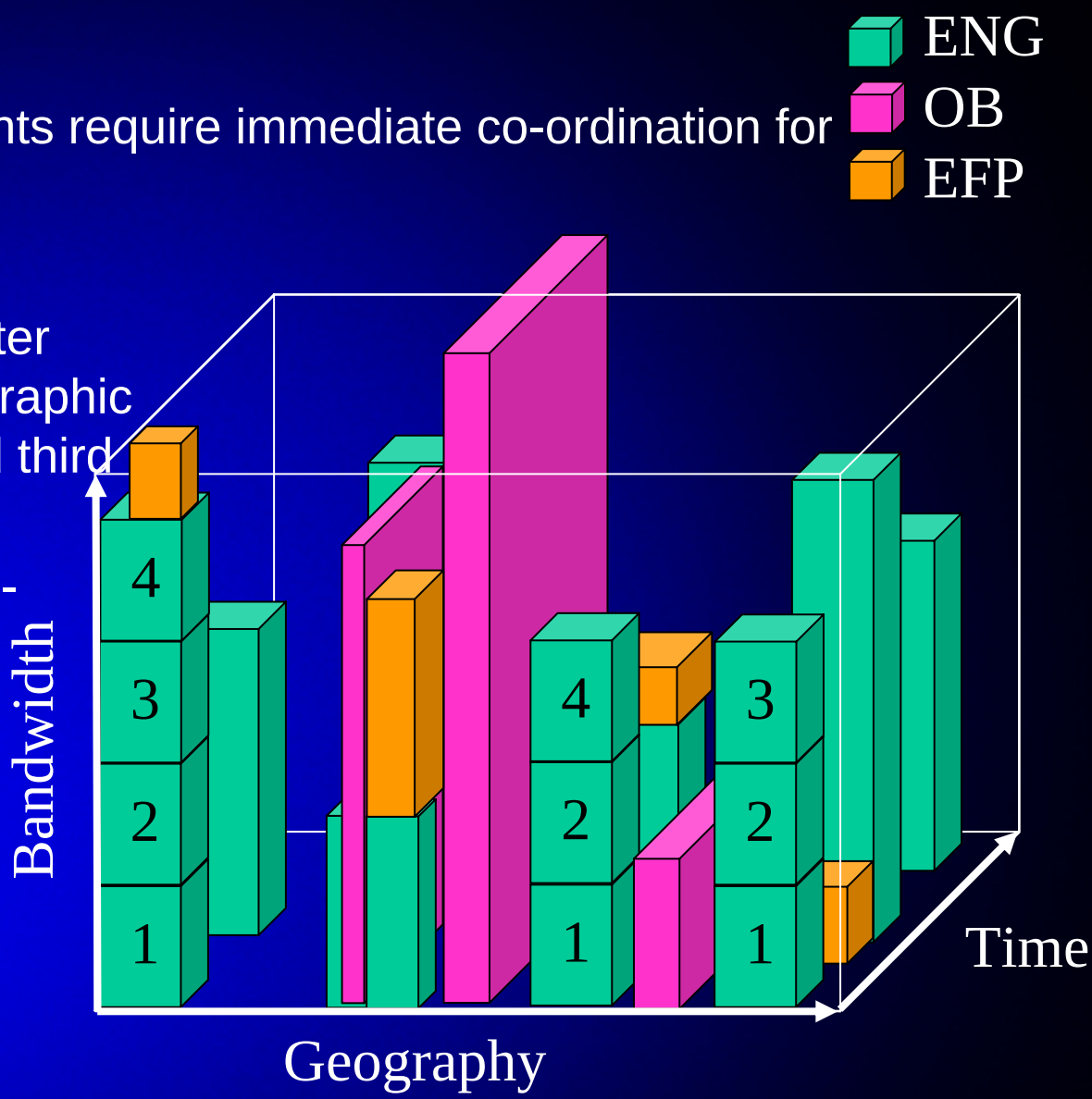


INTERLEAVED

TOB Network Licences : (7) = Seven Network; (9) = Nine Network; (10) = Ten Network; (ABC) = ABC Network

Band Sharing

- ENG
  - Often competitive events require immediate co-ordination for interference resolution
- OB
  - Often single broadcaster event in any one geographic area needs authorised third party use
  - Peaks managed by co-ordination
- EFP
  - Planned events that are somewhat flexible in timing to avoid ENG and OB activities



Who's Watching

- ENG is important for News which draw large audiences
  - 38% of Australian population view evening news in one day
  - 76% in one week
  - 91% in one month

  source : Oztam Data July 2005 1700-1930 news and current affairs programmes
- OBs are important as Sport broadcasts are popular
  - Australian Rules Football 91% of population view in any season
  - Australian Open Tennis 80% of population view some part of the tournament
  - Cricket (2005 -06 summer season includes 1 day matches and 5 day tests) 85% of population view a broadcast
  - V8 Supercars (Motor Racing) 57% of population view a broadcast over the season of 25 rounds

  source : Oztam

Conclusions

- Australian broadcasters make extensive use of ENG,OB and EFP as they provide production facilities for compelling content, essential for the viability of free-to-air commercial television
- These activities require characteristics that are unique to spectrum below 3GHz
- The band is used heavily for programs with wide audience appeal
- Many broadcast events have large spectrum requirements, these would not be able to be covered without sharing and co-ordination between broadcasters of adjacent channels
- Viewer display size & high definition requirements in the future will increase usage and the need for sharing adjacent channels

Thank You