

**TECHNICAL ASPECTS IN CHANNEL PLANNING
FOR DIGITAL TERRESTRIAL TELEVISION
BROADCASTING IN NIGERIA**

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WHY DIGITAL BROADCASTING?

- **Consistent service quality with improved immunity to noise**
- **Near error-free picture and sound propagation within the range of performance**
- **Lower operating costs through the use of compression technology**
- **Efficient use of the spectrum; small re-use distance**
- **Lower transmitter power required compared with analogue counterpart**

KEY OBJECTIVES IN CHANNEL PLANNING

- **To minimize or avoid interference and disruption to analogue television reception.**
- **To identify a number of channels that can be used for digital services at sufficient e.r.p. levels to achieve the same level of coverage from the same transmitting sites as analogue services**

CONSTRAINTS

- **The suitability of existing transmission facilities; and**
- **The population of existing receive antennas**

TYPES OF INTERFERENCE

- **Digital-to-analogue Interference**
- **Digital-to-digital interference**

DIGITAL-TOANALOGUE INTERFERENCE

- **Degree of degradation on analogue services from digital services**
- **Digital spectrum characteristic is similar to Gaussian noise**
- **Effect of CCI is to raise the noise thresholds of analogue receivers**
- **Overall effect is reduction in picture grade**

DIGITAL-TO-DIGITAL INTERFERENCE

- Degree of degradation to digital service from a digital service
- The effect is to increase the system's susceptibility as the modulation levels are increase.
- However, higher modulation levels allows very sophisticated error-management schemes

DIGITAL CHANNEL PLANNING METHODOLOGY

- **Propagation prediction methods**
- **Station Information**
- **Establishment of the size of analogue coverage areas**
- **Establishment of the size of digital coverage areas**
- **Protection ratio**

**Proper propagation prediction methods using information
from a terrain data bank are needed**

STATION INFORMATION

- **Name**
- **Channel Number**
- **Frequency of operation**
- **Location**
- **ERP**
- **Antenna Height**
- **Polarisation**

SIZE OF ANALOGUE COVERAGE AREAS

- **Need for analogue coverage area to estimate digital service e.r.p.**
- **Impact of co-channel interference on analogue services**
- **Impact of adjacent channel interference on analogue services**

CO-CHANNEL INTERFERENCE

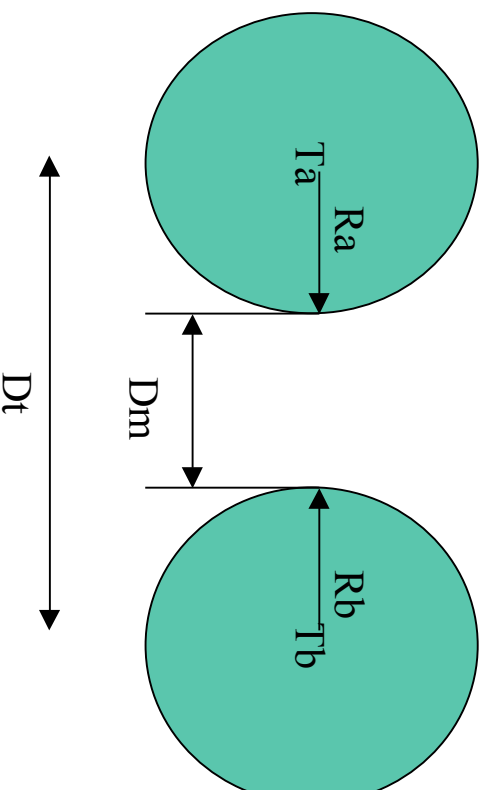


Figure 1: Protection Ratio Parameters

PROTECTION RATIO PARAMETERS

$$R_p = \frac{D_t - (R_a + R_b)}{D_m}$$

R_p - Protection ratio

D_t - Line of sight distance between two co-channel transmitter

D_m - Limiting Distance between them

R_a - Service range of transmitter A

R_b - Service range of transmitter B

LEVELS OF PROTECTION

$$\frac{Dt - (Ra + Rb)}{Dm} = 1$$

Dm

$$\frac{Dt - (Ra + Rb)}{Dm} > 1$$

Dm

$$\frac{Dt - (Ra + Rb)}{Dm} < 1$$

Dm

SIZE OF DIGITAL COVERAGE AREAS MORE COMPLICATED; WHY?

- **Maximum e.r.p. can be largest value which does not cause unacceptable interference**
- **Polarization may be the same with existing analogue service or orthogonal**
- **Planning to choose required standard**

REQUIRED PROTECTION RATIO

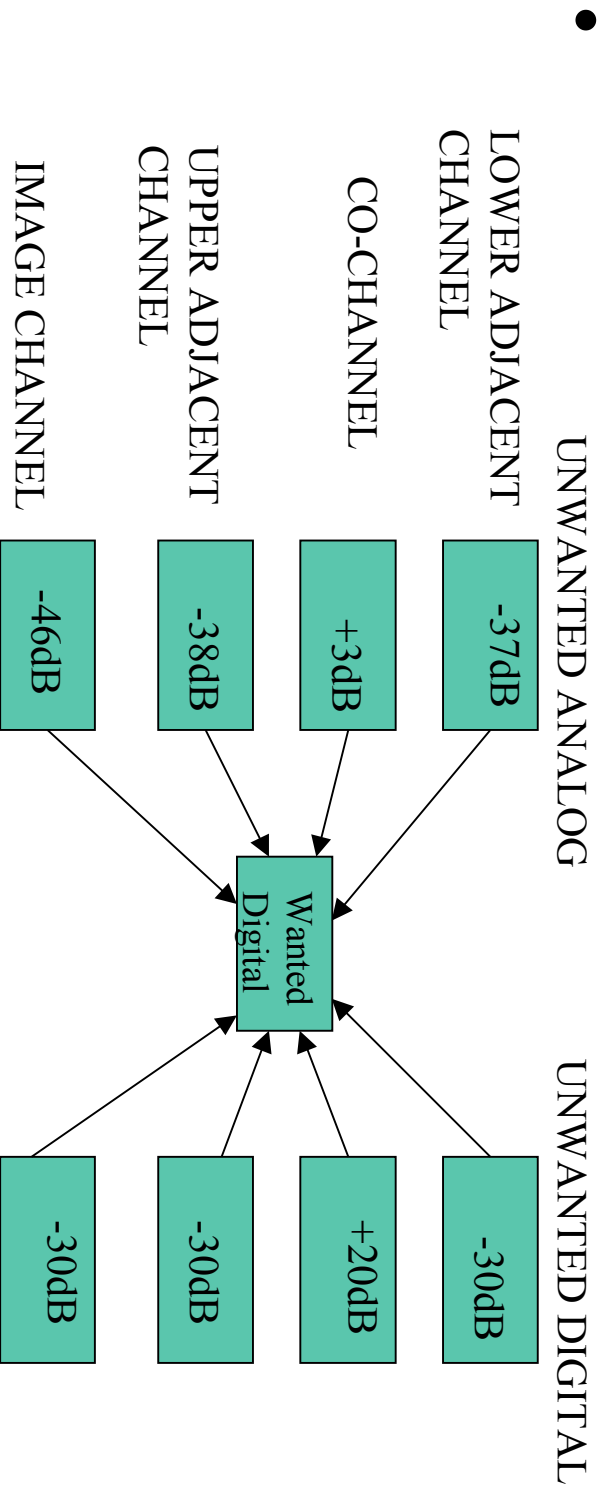
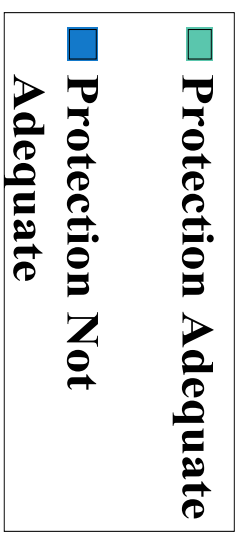
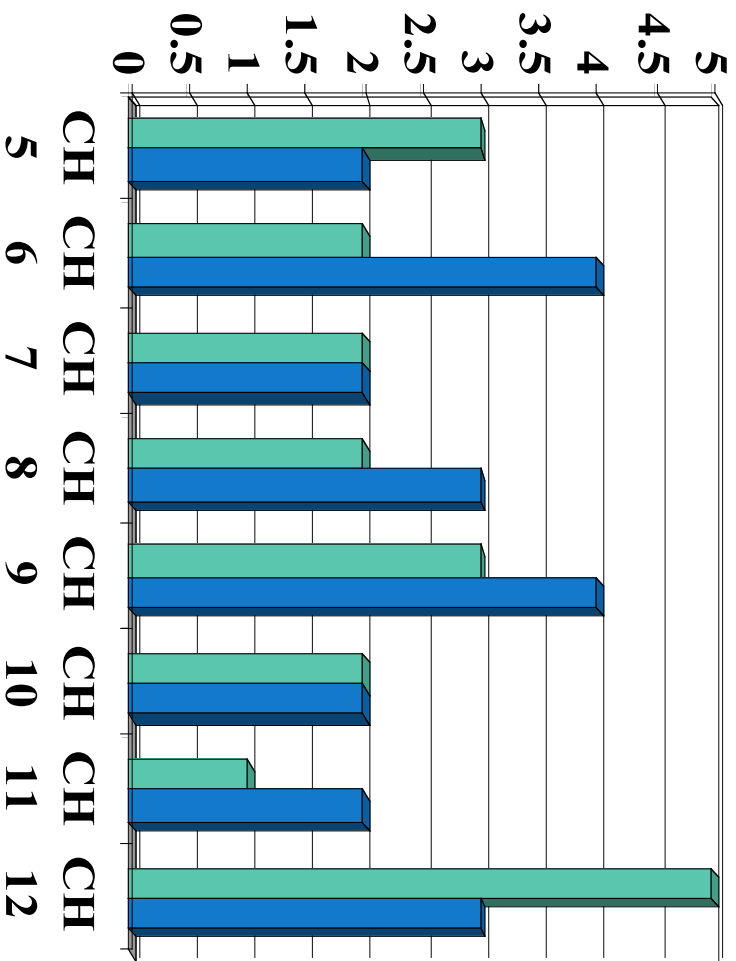


FIGURE 2: DIGITAL PROTECTION RATIO

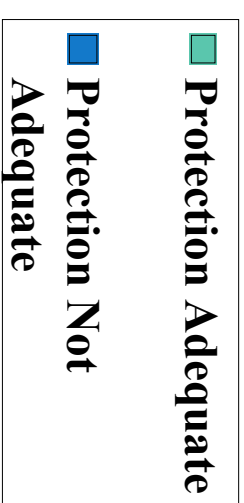
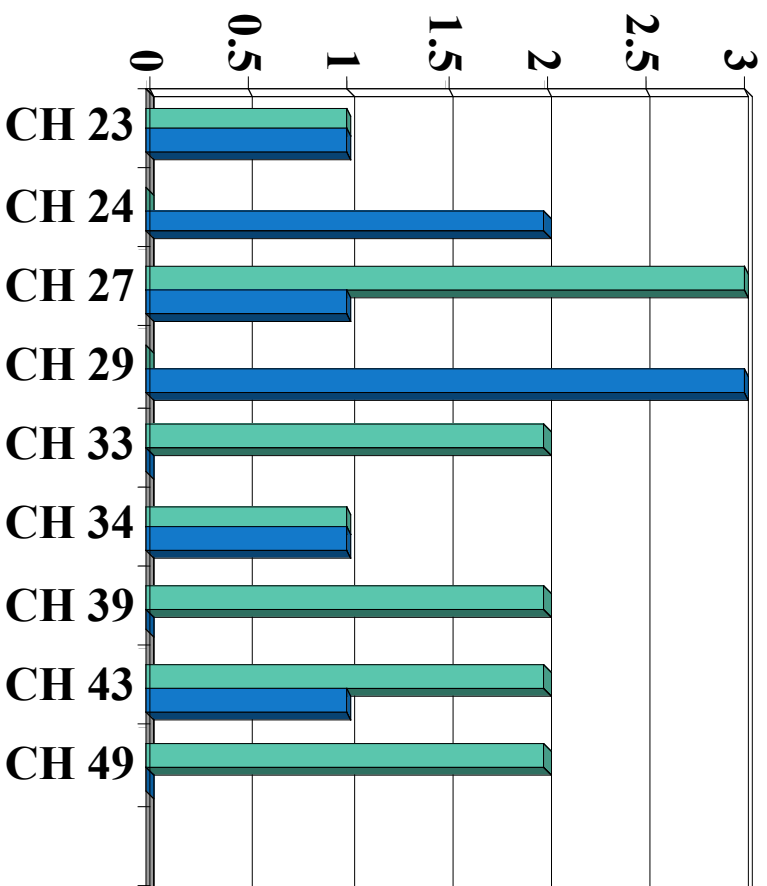
THE SITUATION IN NIGERIA

- **42 CO-CHANNEL VHF STATIONS**
- **22 CO-CHANNEL UHF STATIONS**
- **NUMBER INCLUDE PROPOSED ANALOGUE TELEVISION STATIONS**

LEVEL OF PROTECTION AGAINST CO-CHANNEL INTERFERENCE IN VHF TELEVISION STATIONS IN NIGERIA.



LEVEL OF PROTECTION AGAINST CO-CHANNEL INTERFERENCE IN UHF TELEVISION STATIONS IN NIGERIA



PREFERENTIAL TELEVISION CHANNEL FOR DIGITAL TELEVISION IN NIGERIA

VHF BAND III	CH 5 - 12	Not preferred for digital television because of co-channel interference
UHF BAND IV	CH 28 - 35	Not preferred for digital television because of co-channel interference
UHF BAND V	CH 36 - 69	Preferred for digital transmission since it is relatively free from CCI