ITU Workshop on
"Practical measurement of EMF exposure"

(Gaborone, Botswana, 25-26 July 2011)

ITU-T Recommendations concerning EMF

Dr. Fryderyk Lewicki
ITU-T SG5, Rapporteur for Q 3/5
Telekomunikacja Polska
Orange Labs Poland

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Introduction

■ Radiocommunication equipment is the main source of electromagnetic radiation in human environment

■ There is a big public concern about the influence of electromagnetic radiation on human health

■ ITU-T is the entity that is responsible for the international development, standardization and coordination in the field of telecommunication

■ The activity in ITU-T SG5 is the response to the need of human protection against EM radiation

ITU-T Study Group 5

- Question 3/5: Human exposure to electromagnetic fields (EMF) due to radio systems and mobile equipment (ITU-T Rec. K.52, K.61, K.70, K.83, K.guide

- Question 11/5: ITU-T Rec. K.mag

- Best practice and mitigation techniques in the protection against non-ionizing radiation

- Consideration of the areas near transmitting and base stations with many radiating sources - radiocommunication and broadcasting systems

- Support to developing countries – Resolution 72
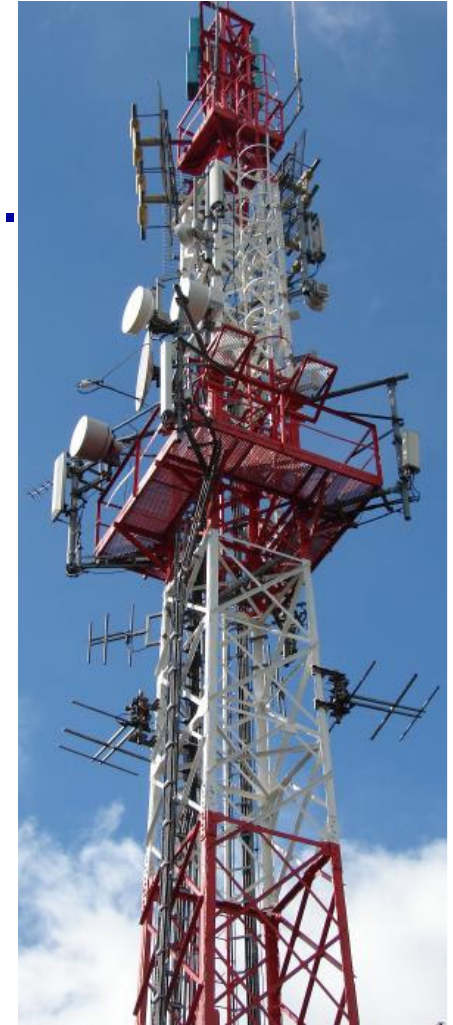
Recommendation ITU-T K.52

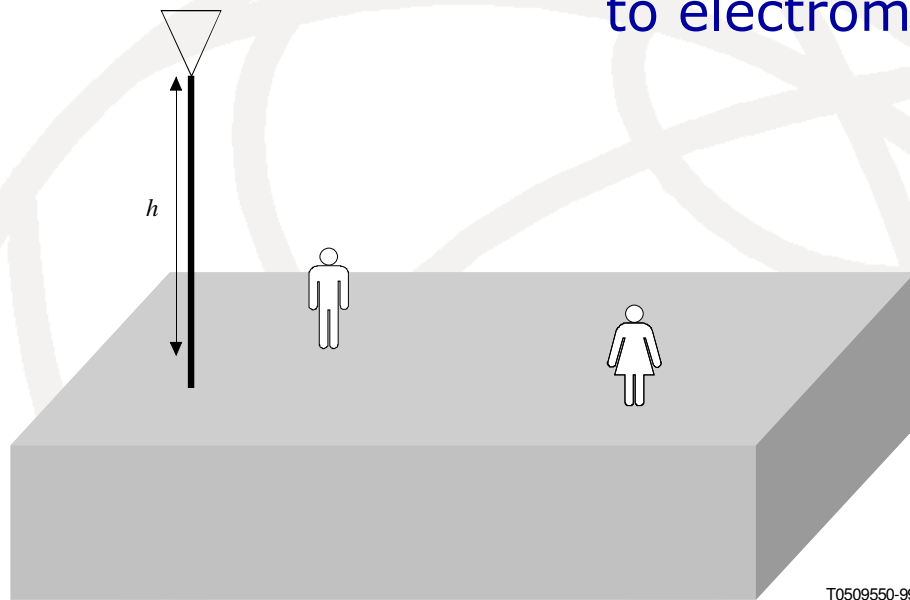## Guidance on complying with limits for human exposure to electromagnetic fields

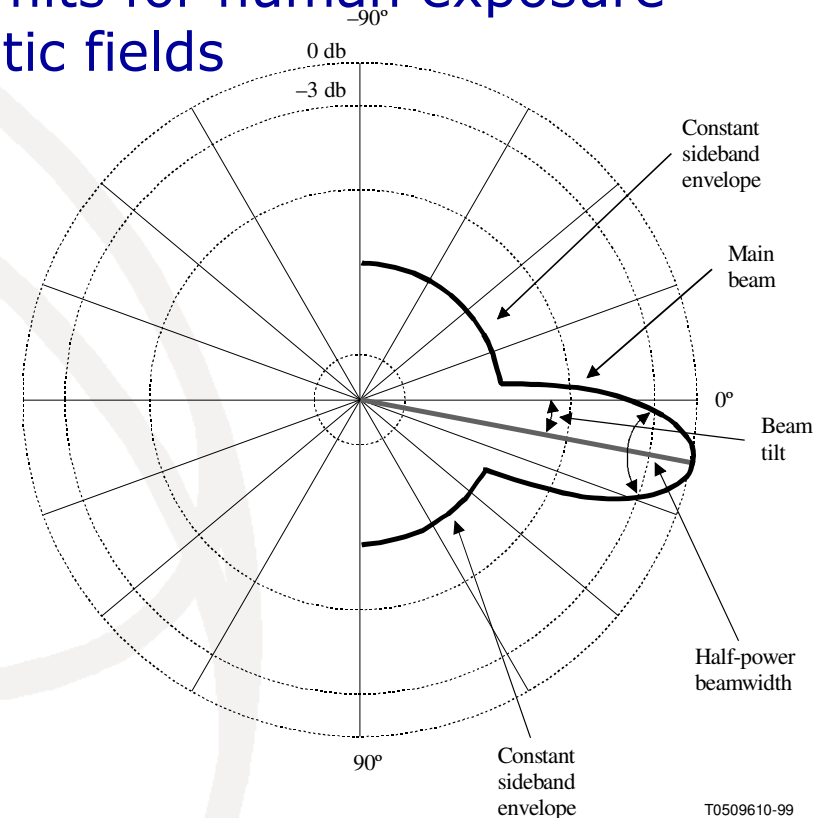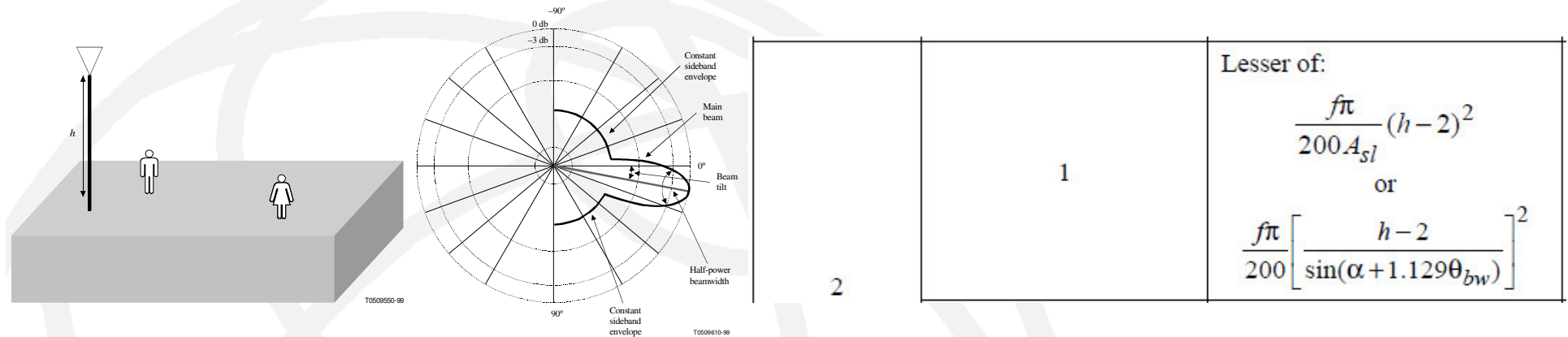**Figure B.1/K.52 – Illustration of the accessibility category 1**

Figure B.7/K.52 – Illustration of terms relating to antenna patterns

Compliance testing in an easy way:
Accessibility category + directivity category
= maximum EIRP Compliance with ICNIRP limits

Recommendation ITU-T K.52
Example of compliance assessment

BS with panel 742 271 operating on 900 MHz band only

General public exposure

Accessibility category: 1, Directivity category: 2

Vertical bandwidth θ_{bw}=10°, beam tilt α=0°, Maximum sidelobe amplitude (in the direction to the ground): -26 dB (0,05 V/V), h = 35 m a.g.l.

Compliance is for the EIRP (see table III.1/K.52)

EIRP< min(325 kW, 424 kW) = 325 kW

Recommendation ITU-T K.61

Guidance on measurement and numerical prediction of electromagnetic fields for compliance with human exposure limits, for telecommunication installations

■ Measurement instrumentation, measurement uncertainties, Probe selection, Procedures, Safety precautions, Field regions, Multiple sources, Time and spatial variability

■ List and short description of numerical methods

K.61(08)_F03
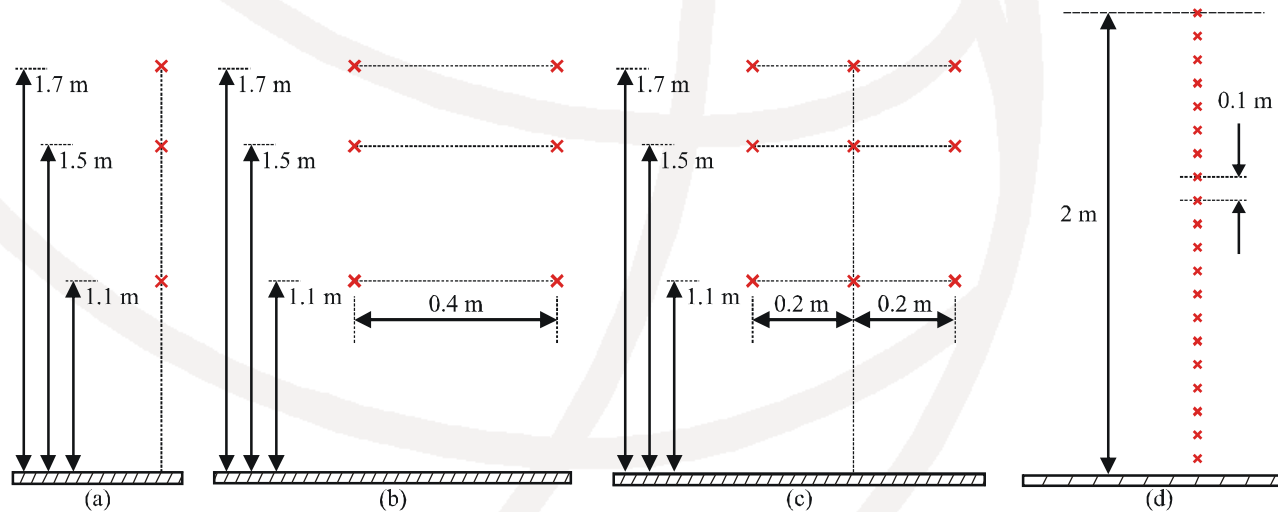
ITU-T Recommendation K.83

Monitoring of EMF levels

- EMF fields are unknown to the general public

- The confidence may be achieved thanks to the control of the EMF by taking continuous measurements and having a proper communication (for example websites)

- The balance between costs and accuracy is very important (broadband and frequency selective measurement)
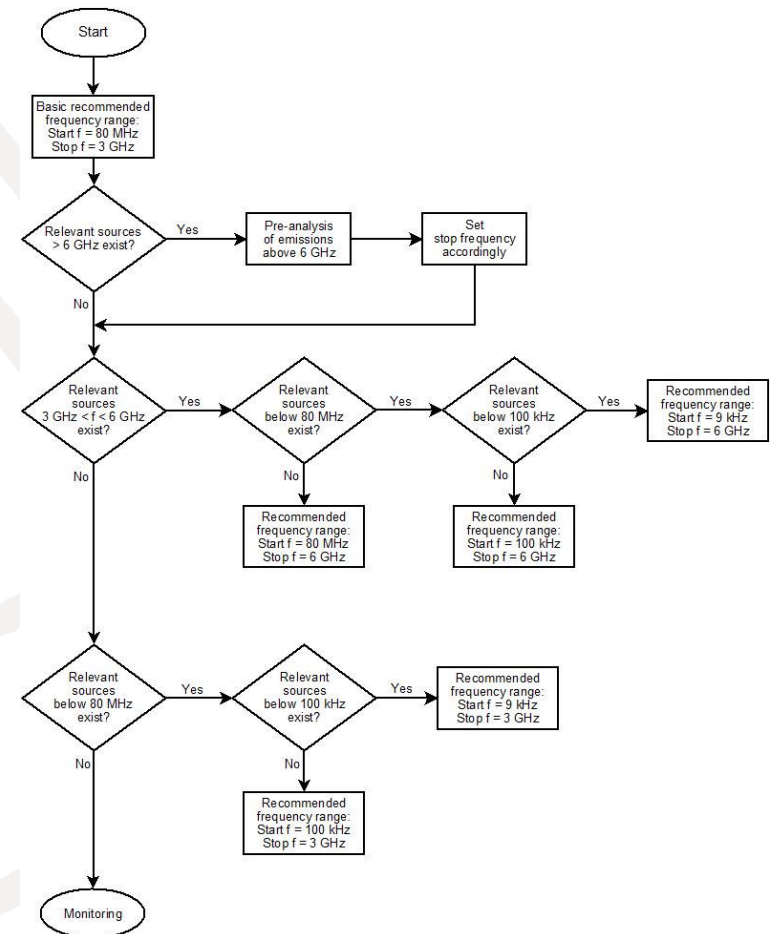
ITU-T Rec. K.70, EMF-estimator

Mitigation techniques to limit human exposure to EMFs in the vicinity of radiocommunication stations
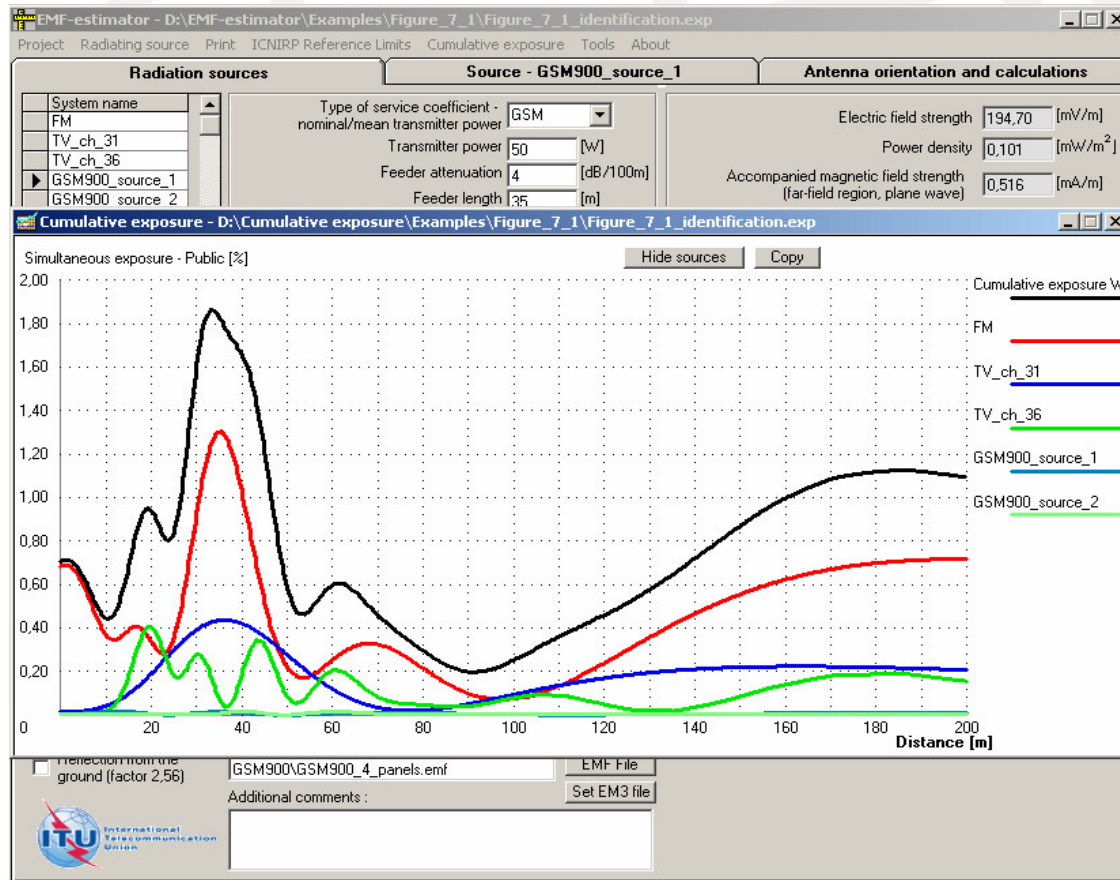
- Modeling of the transmitting antennas
- Importance of the Vertical Radiation Pattern (VRP)
- Identification of the main source of radiation
- Mitigation techniques employed to reduce radiation level – if required
- EMF-estimator – software including the library of examples of transmitting antennas
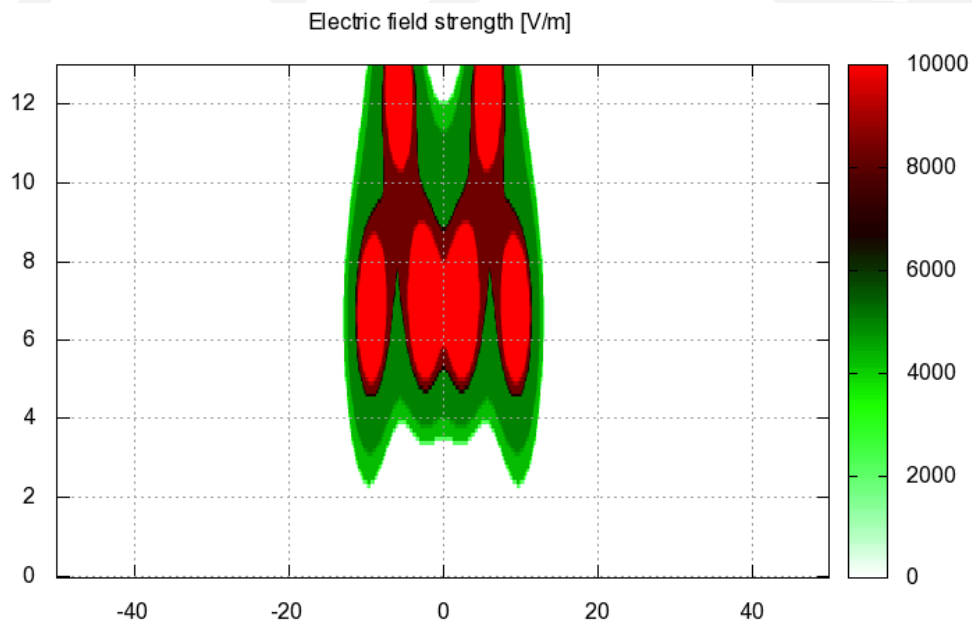
ITU-T Recommendation K.guide

- It is under development (planned for 2012)
- There are plenty of standards concerning human exposure assessment
- Most of the standards are very general or product oriented
- In real environment there are many sources of radiation operating simultaneously
- Guidance on the assessment of human exposure is required

ITU-T Recommendation K.mag

Evaluation techniques and working procedures for compliance with limits to power-frequency (DC, 50 Hz, and 60 Hz), electromagnetic field exposure of network operator personnel

Electric field strength [V/m]

- Guidelines for the compliance with safety limits for the personnel
- EMF in the vicinity of medium-voltage (MV) and high-voltage (HV) power lines at power frequencies (DC, 50 Hz, and 60 Hz)

ITU-R Recommendation ITU-R BS.1698

Evaluation Evaluating fields from terrestrial broadcasting transmitting systems operating in any frequency band for assessing exposure to non ionizing radiation

- **Many practical information concerning exposure assessment around AM antennas (LW, MW and SW)**
- **Guidelines for the exposure assessment in the vicinity of the Fixed Point-to-point antennas**

Relationship between carrier, average, peak and maximum instantaneous power, for different classes of emission (worst-case figures)

Class of emission (basic characteristics) [1], [2]	Known power type								
	Carrier power, P_c			Mean power, P_m			Peak power, P_p		
	Factor for the determination of:			Factor for the determination of:			Factor for the determination of:		
	P_c	P_m	P_p	P_c	P_m	P_p	P_c	P_m	P_p
A1A A1B	1	1	1	1	1	1	1	1	1
A*C A*E	1	1.5	4	0.67	1	2.67	0.25	0.38	1
B*B[3] B*E[3] B*W[3]	–	–	–	–	1	1	–	1	1

Conclusions

- There are many standards concerning human exposure assessment
- ITU-T gives Guidance on how to use them in an efficient way
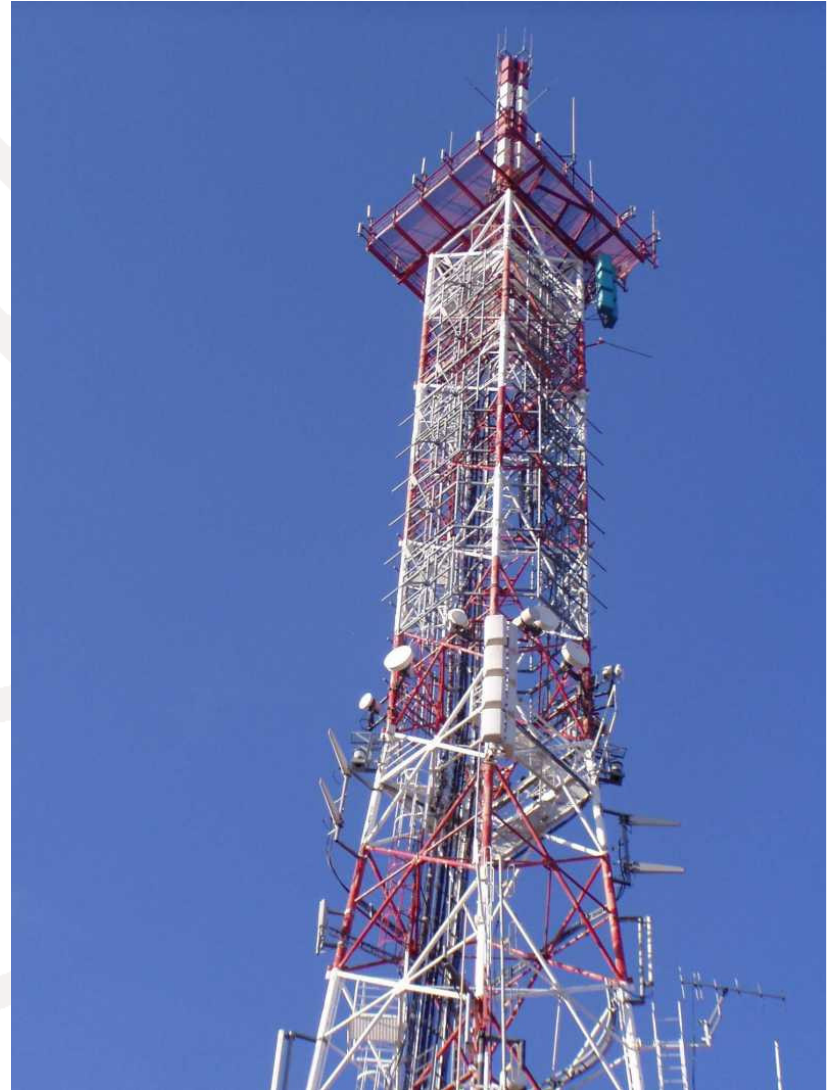
Thank you

Questions, Comments ?

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