ITU Regional Development Forum 2008
"Bridging the ICT standardization gap in developing countries"

Protection from electromagnetic environment effects

Roberto Pomponi,

ITU-T SG 5 Chairman

(Telecom Italia)

ITU-T SG 5

- SG 5 Title:

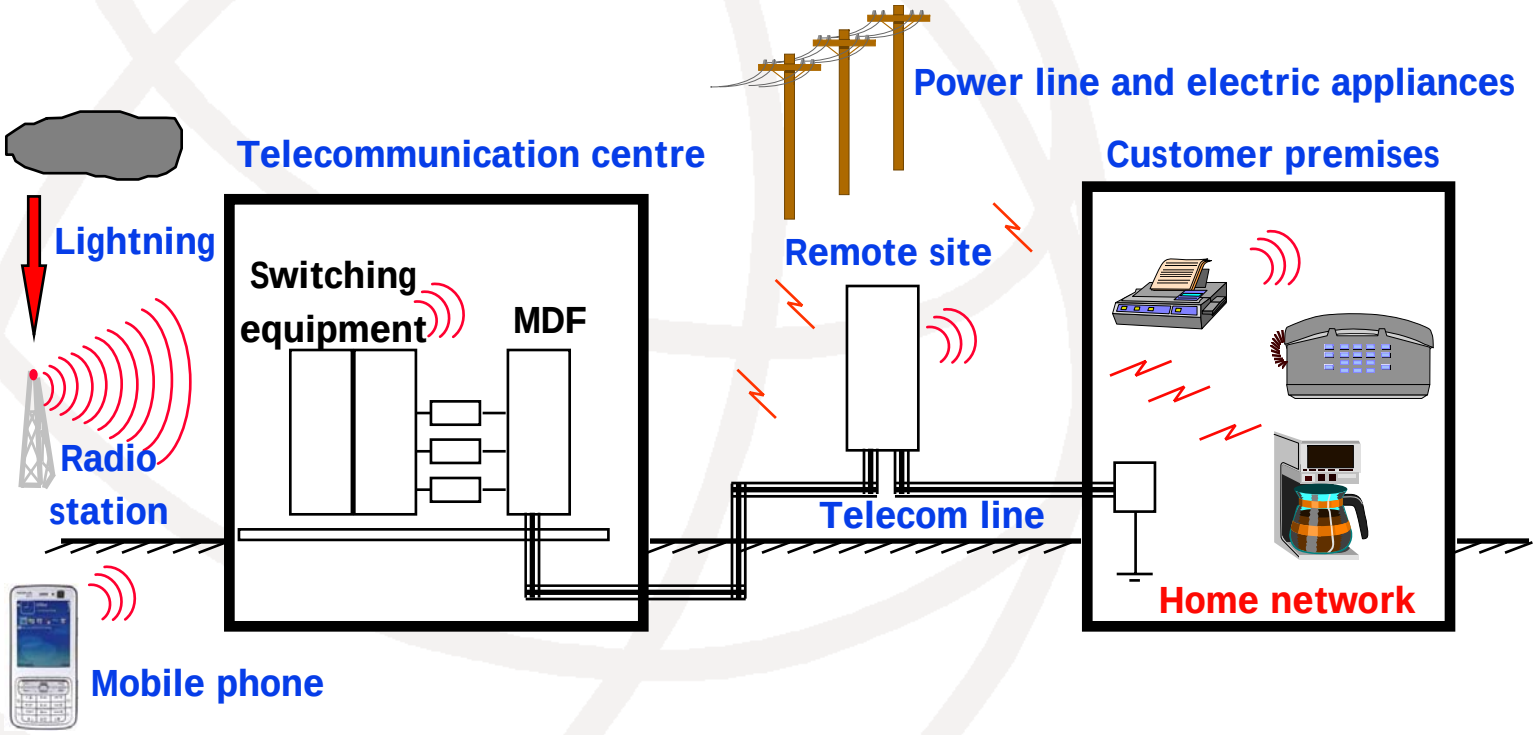
  "*Protection against electromagnetic environment effects*"

- SG 5 Mandate

  "*SG 5 is responsible for studies relating to electromagnetic compatibility (EMC) of telecommunication systems including to avoid hazard to human beings*"

Meaning of SG 5 Mandate

Study Electromagnetic Phenomena which can cause **damages or disturbances** to telecommunication installation or **injury** to people (telecommunication personnel and service users) or **health effect** to population



SG 5 Keywords

Working Party 1/5

- Equipment Resistibility
- Lightning protection
- Earthing & Bonding
- Electromagnetic interference from power and traction systems
- Safety

Working Party 2/5

- Human exposure to e.m. fields
- EMC
- Electromagnetic security

Objective

- Study electromagnetic phenomena to define PROTECTIVE MEASURES and/or INSTALLATION TECHNIQUES by means
  - Recommendations: k-series
  - Directives
  - Handbooks
- for limiting the risk of
  - Damages to telecommunication installation and equipment
  - Disturbances to and from telecommunication systems
  - Injury to people

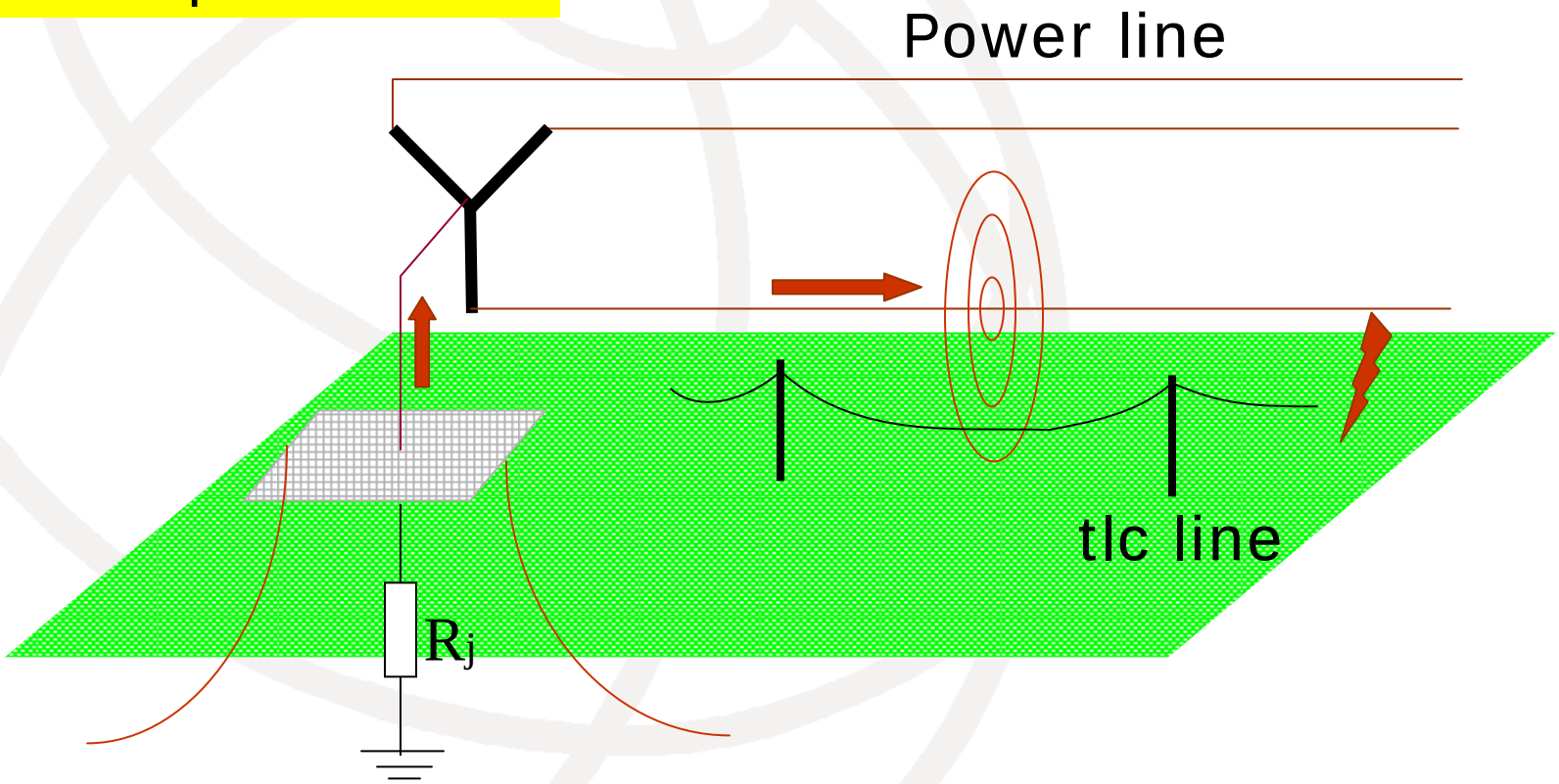
Outline of the presentation

- Interference between power and traction lines and telecommunication lines
- Solving electromagnetic problems occurred in the field
- Human exposure to EMFs
- Guide to use ITU-T Publications produced by SG 5
- Technical Sessions
- Regional Group

Example of e.m. interference: Phase-to-Earth Fault

There are two effects:

- Induction
- Earth potential rise



Interference between power and traction lines and tlc lines

- DIRECTIVES “Protection of telecommunication lines against harmful effects from electric power and electrified railway lines”
- 1988 edition: Nine Volumes
  - Volume I: broad understanding of tlc, power and traction facilities and their mutual coupling effects
  - Volumes IV and V (2008): further information on inducing installations in power and traction systems
  - Volumes II (1998) and III: understanding the physical-mathematical theory of the e.m. interference and to know calculation methods
  - Volume VI (2008): effects of induced voltages and currents – danger, damage and interference – and the recommended permissible values
  - Volume VIII: advice on protective components
  - Volume IX: information on testing and measuring techniques

Directives

- Since their first edition (1952), Directives have been the worldwide reference text used for establishing regional or national standards
- Directives were established when the number of actors involved in the e.m. interference was low
  - One tlc, power and traction company per country
  - Problem managed by few specialists
- Now the actors are highly increased
- Actors require guidance through the large amount of information both at scientific and practical design levels given in the Directives

New Recommendation K.68

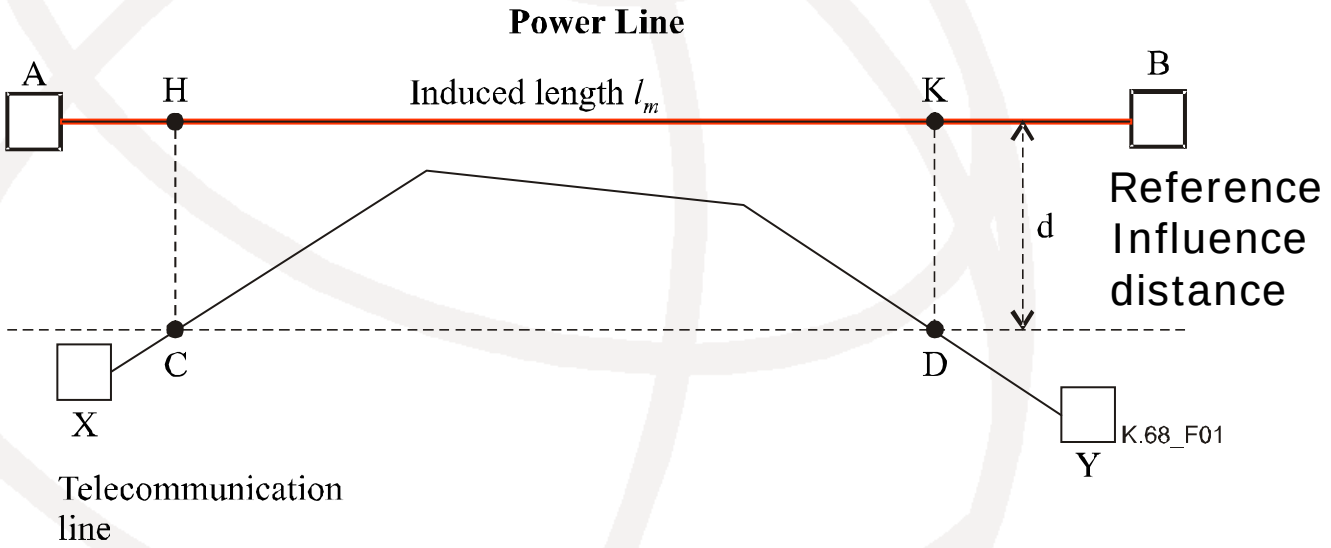
- Title: *Management of the e.m. interference on tlc system due to power systems and operators' responsibilities*
- K.68 answers the following questions:
  - *When* the e.m. interference has to be evaluated
    - The involved plants are within a defined maximum distance
  - *How* this evaluation shall be carried out
    - The installation and working conditions of the involved plants are defined
  - *Who* is responsible for the e.m. interference
    - Permissible voltages, defined in Volume VI, are those which power and traction systems are allowed to cause on a tlc line without the operators of power and traction systems being responsible for mitigation measures
    - Responsibility based on Principle of priority (first coming)

New Recommendation K.68

- Title: *Management of the e.m. interference on tlc system due to power systems and operators' responsibilities*
- K.68 answers the following questions:
  - *When* the e.m. interference has to be evaluated
  - *How* this evaluation shall be carried out
  - *Who* is responsible for the e.m. interference

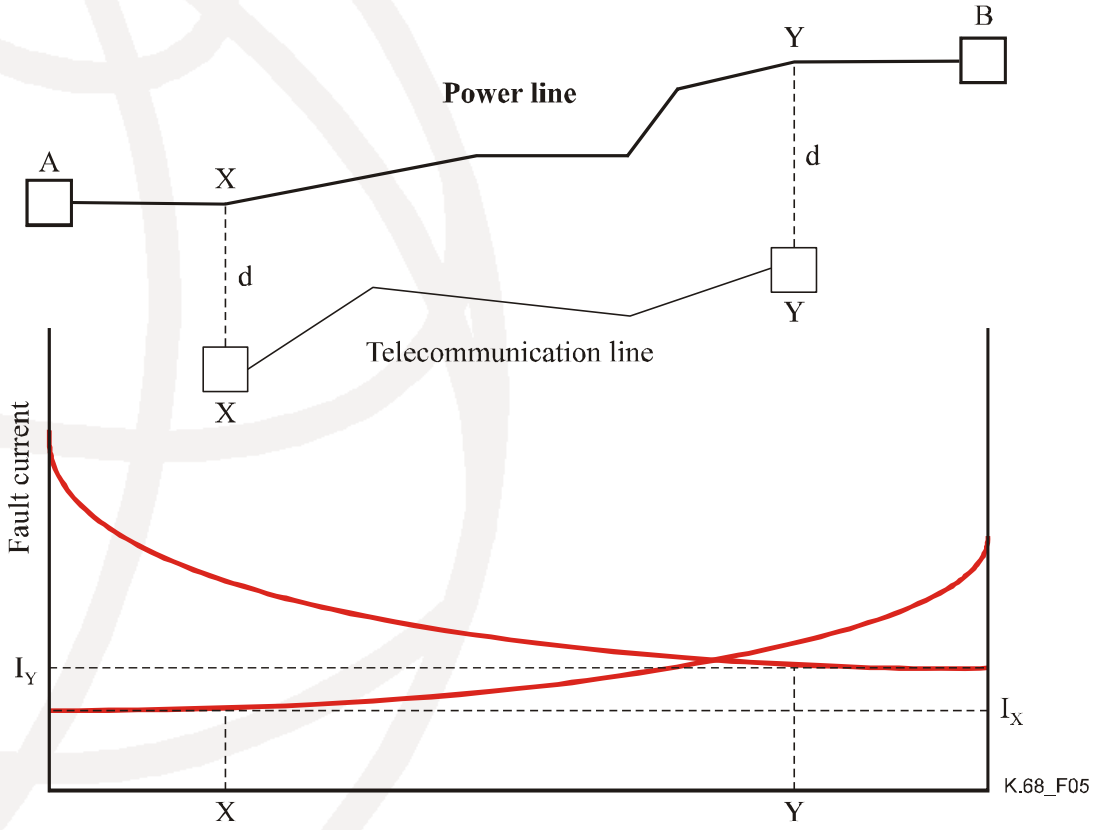
When the e.m. interference has to be evaluated

- The involved plants are within a defined maximum distance



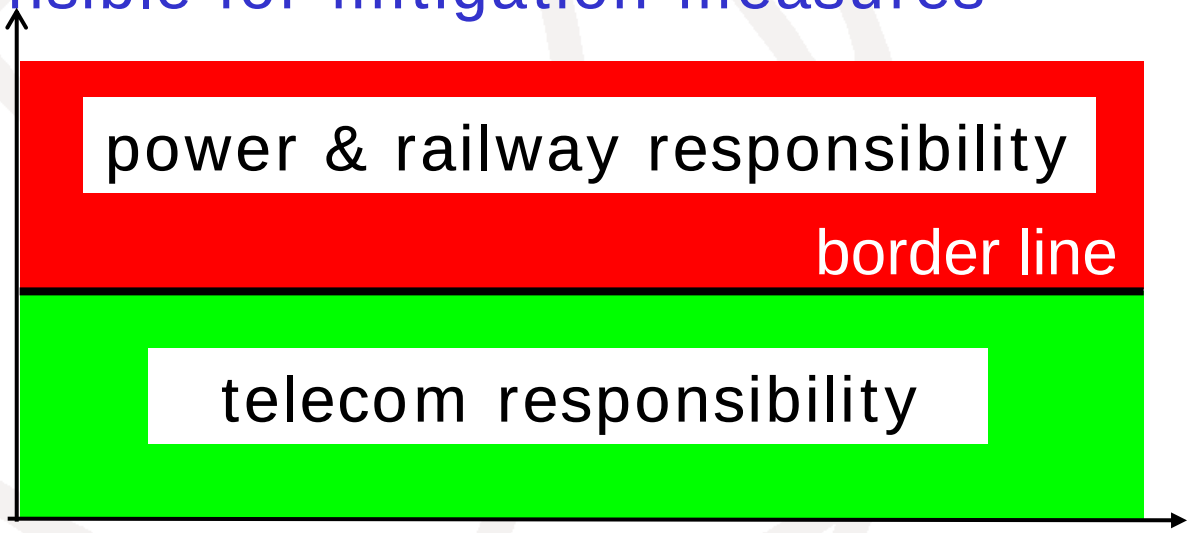
How evaluation has to be carried out

- The interference conditions of the involved plants must be realistic (their probability to appear must not be very low) and the most severe ones
  - Inducing plant:
    - Maximum length
    - Maximum inducing current



Who is responsible for the e.m. interference

- Permissible voltages, defined in Volume VI, are those which power and traction systems are allowed to cause on a tlc line without the operators of power and traction systems being responsible for mitigation measures

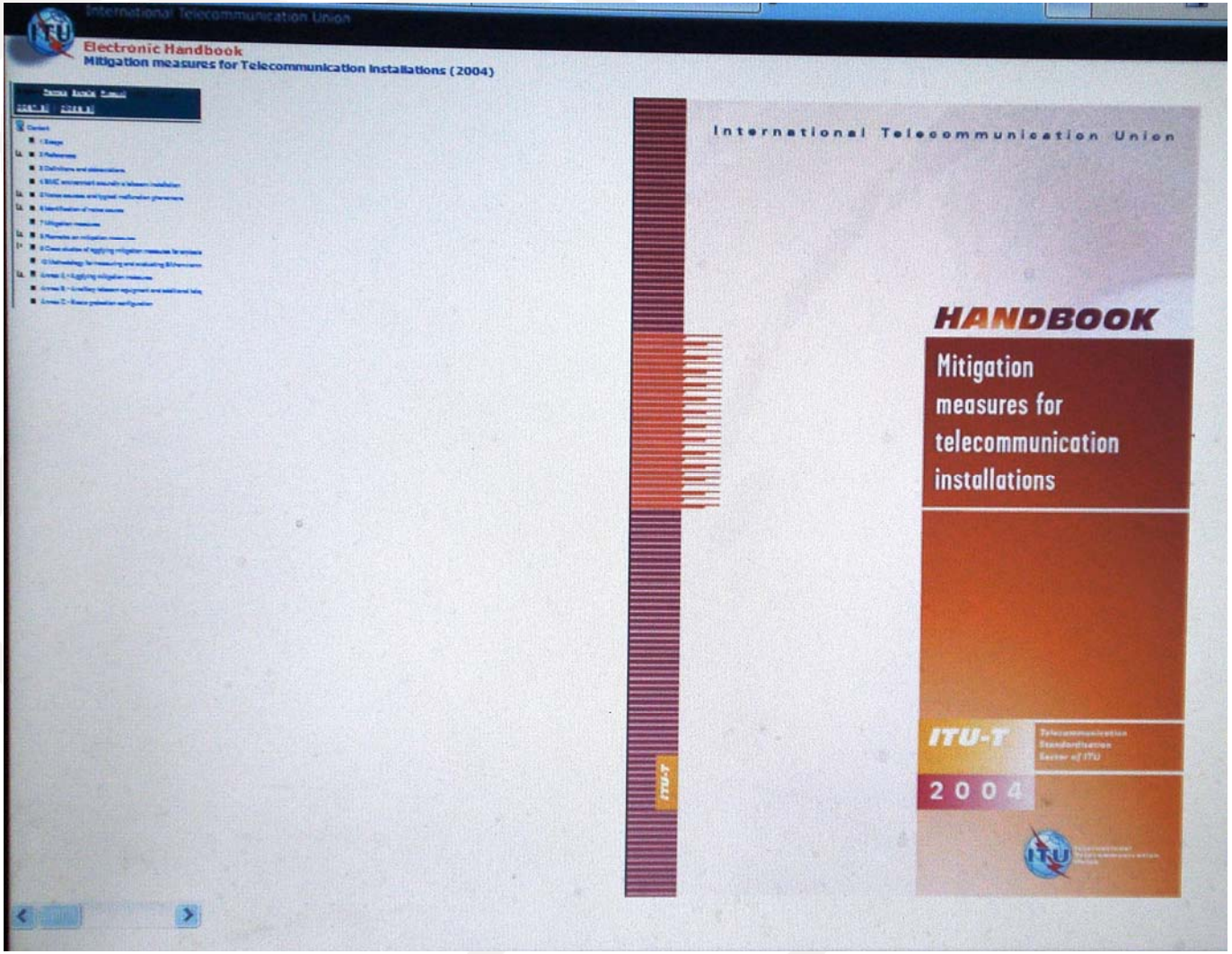


- Responsibility based on Principle of priority (first coming)

Solving e.m. problems

- Protective measures can not avoid the problems in the field but can only to reduce them to a tolerable value
- Problems occurred in the field and how they have been solved by the Network Operators are collected in the "*Mitigation Handbook*"
- This Handbook will be available on the web in short time

Web version of Mitigation Handbook: prototype



Human exposure to Electro-Magnetic Fields (EMFs) due to radio systems and mobile equipment

- Mobile and radio telecommunication systems are contributing to EMFs in the environment
- Telecommunication operators, manufacturers, government agencies and other stakeholders have to
  - assess (i.e. measure or calculate) the levels of EMFs emitted by telecommunication systems and radio terminals
  - check if they comply with the applicable national or international EMF legislation or with international standards (ICNIRP guidelines and IEEE standard)

New Recommendation K.70

- Title "*Mitigation techniques to limit human exposure to EMFs in the vicinity of radio communication stations* "
- Techniques which may be used by telecommunication operators to evaluate the cumulative (total) exposure in the vicinity of transmitting antennas and to identify the main source of radiation
- Guidance on mitigation methods which allow to reduce the radiation level in order to comply with exposure limits
- An EMF-estimator software is attached as a tool to support the application and explanation of this Recommendation

Human exposure to EMFs in the next Study Period: Main objective

- ITU should define guidelines for the protection of people exposed to EMF emitted by wireless telecommunication equipment
- These guidelines should provide appropriate support to countries in establishing national regulations concerning exposure to EMFs

Guide to the use of ITU-T Publications produced by SG 5

- The document is aimed at telecommunications equipment designers and operators and will also be very helpful for users in developing countries
- The objective of this Guide is to help the user of ITU-T SG 5 publications in selecting applicable documents

Example: Telecommunication lines at outdoor locations (1)

		Phenomena		
Type and subject of Publications		**power supply effects and low frequency interference (safety, resistibility, immunity)**	**high frequency induction (immunity, mitigation, emission)**	**lightning (resistibility, protection)**
Basic	calculation/ estimation	K.10, K.26, K.68 Directives Vol. II, III	K.18	
	testing/ measuring	K.10, K.26, Directives Vol. IX,	K.24	
Generic		K.26, Directives Vol. I		Lightning Handbook

Example: Telecommunication lines at outdoor locations (2)

			Phenomena		
Type and subject of Publications			**power supply effects and low frequency interference (safety, resistibility, immunity)**	**high frequency induction (immunity, mitigation, emission)**	**lightning (resistibility, protection)**
Publications concerning protection or mitigation	general		K.11, K.64 Directives Vol. IV, V	K.18	K.11, K.39, K.46, K.47
	protection practice	overhead line pairs	K.5, K.6, Directives Vol VII		Lightning Handbook
		buried cable with metal pairs	K.8, K.13, K.14, K.19, K.29, Directives Vol. VII		K.29, K.46, K.47, Lightning Handbook
		optical fibre cable	K.19, K.29		K.25, K.29
	protection components		K.12, K.36, Directives Vol. VIII		K.39, K.46, K.55, K.65
Publications concerning safety			K.9, K.26, K.50, K.51, Directives Vol. VII	K.52	K.39

Technical Sessions

- Technical Session is a half day discussion on a specific subject organized during the SG 5 meeting
- Its objective is to help the work on new issues
- During this Study Period, SG 5 has organized 5 Technical Sessions and their results are available on the SG 5 web page
  - Home Network
  - Security (from the e. m. point of view)
  - ...
- A Technical Session is already planned for the first meeting (November 2008) in the new Study Period
  - *Injury to persons touching electrical and electronic equipment inside a structure due to lightning*

Regional Group

- Following the WTSA-04 suggestion, SG 5 has undertaken actions to built a Regional Group within the South America Countries
  - Few South America countries, like Argentina and Venezuela, have attended or are not regularly attending SG 5 meetings
- The Brazilian Administration, regularly attending SG 5 meetings from long time, accepted the SG 5 proposal to investigate the possibility to establish a Regional Group between Latin American countries on EMC matters
- Unfortunately we haven't achieve this objective in this Study Period in spite of several actions taken by the Brazilian Administration, in particular during CITEL meetings
- A SG 5 meeting in one South America country could help to build this Regional Group

Conclusions

- This short and incomplete overview of the SG 5 activities has pointed out results on
  - Electromagnetic interference between power and traction lines and telecommunication lines
  - Solving e.m problems in the field
  - Human exposure to EMFs
- The Guide to the use of the SG 5 Publications could be a useful tool in finding the appropriate publication
- SG 5 is trying to create a Regional Group between Latin America countries
- I hope that this presentation could encourage your participation to SG 5 activities

Thank you for your attention