

Lightning protection for Telecommunication Stations



Imp. Carret-Vène - Octobre 2006 -

ABB

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ABB

A recognized skill in lightning protection SKILLS

ABB Soulé located in Bagnères-de-Bigorre (South West of France) has several decades of experience, and uses its technological expertise to provide protection against lightning and overvoltage.

In addition to up-to-date expertise with its global lightning protection offer (external and internal), ABB Soulé now offers a range of lightning conductors and lightning arresters to protect a Telecom site.

ABB Soulé also has a laboratory comprising several generators capable of testing all equipment under real conditions with different amplitude surge currents, in order to optimize protection solutions.

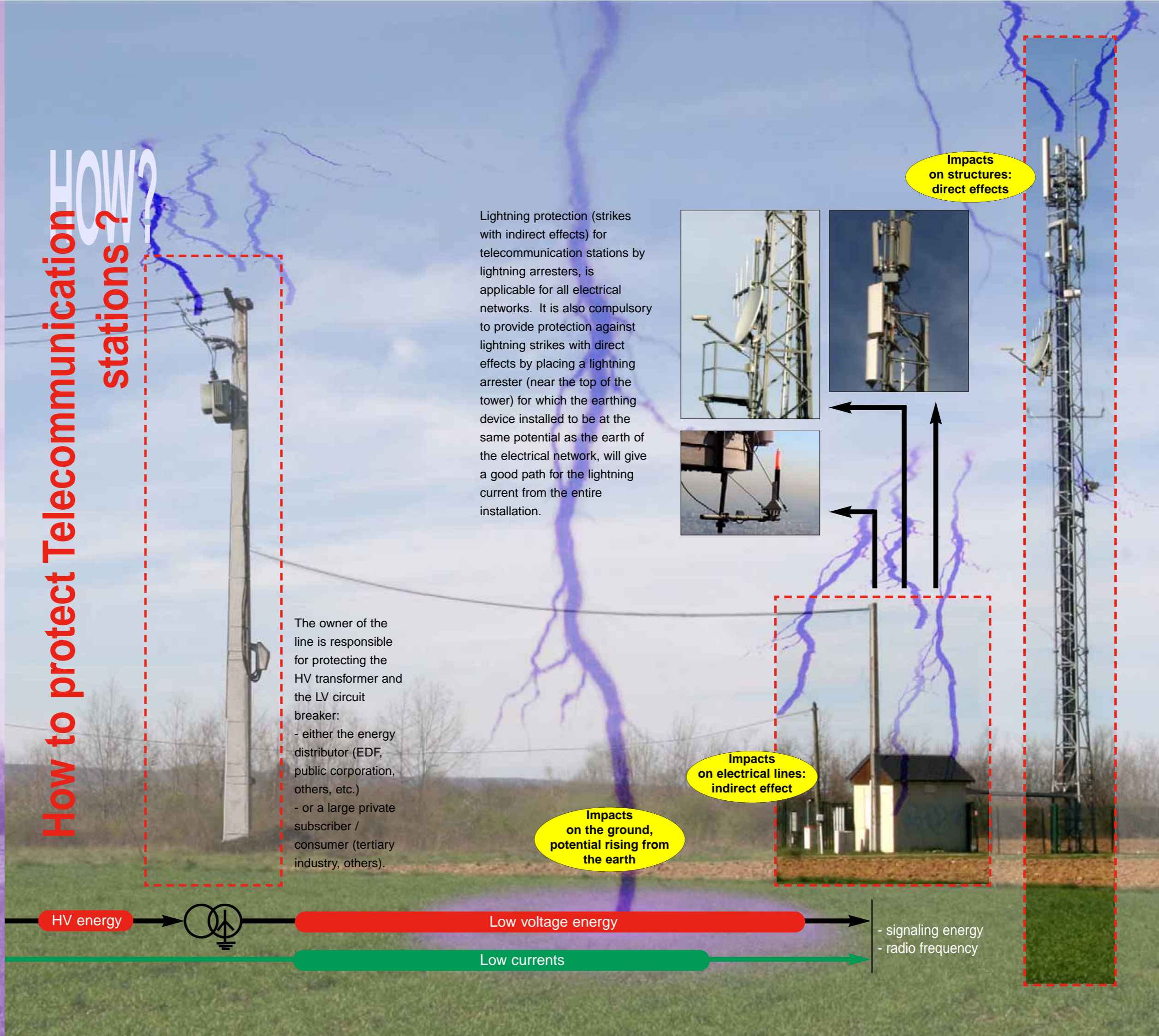


LESPS laboratory in Bagnères-de-Bigorre, France

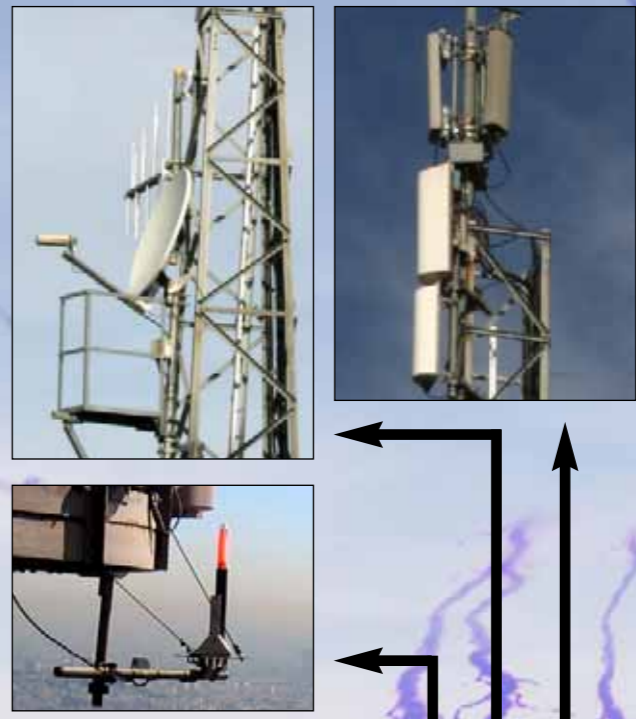


200 kV generator

How to protect Telecommunication stations? HOW?



Lightning protection (strikes with indirect effects) for telecommunication stations by lightning arresters, is applicable for all electrical networks. It is also compulsory to provide protection against lightning strikes with direct effects by placing a lightning arrester (near the top of the tower) for which the earthing device installed to be at the same potential as the earth of the electrical network, will give a good path for the lightning current from the entire installation.

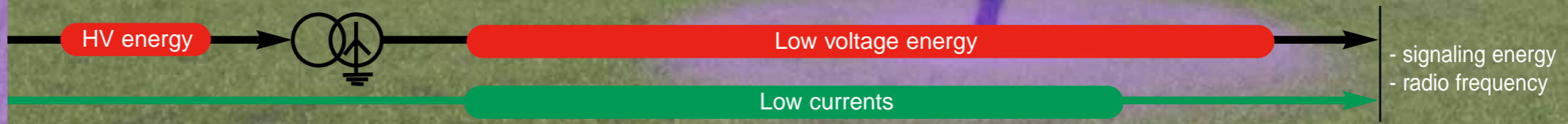


Impacts on structures: direct effects

Impacts on electrical lines: indirect effect

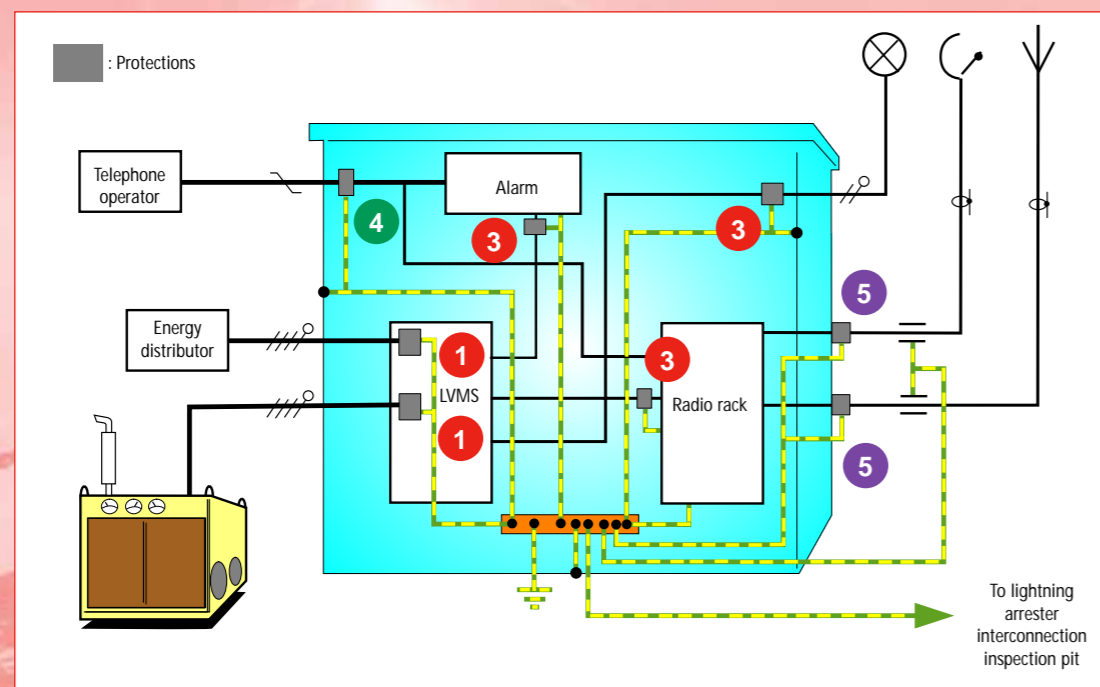
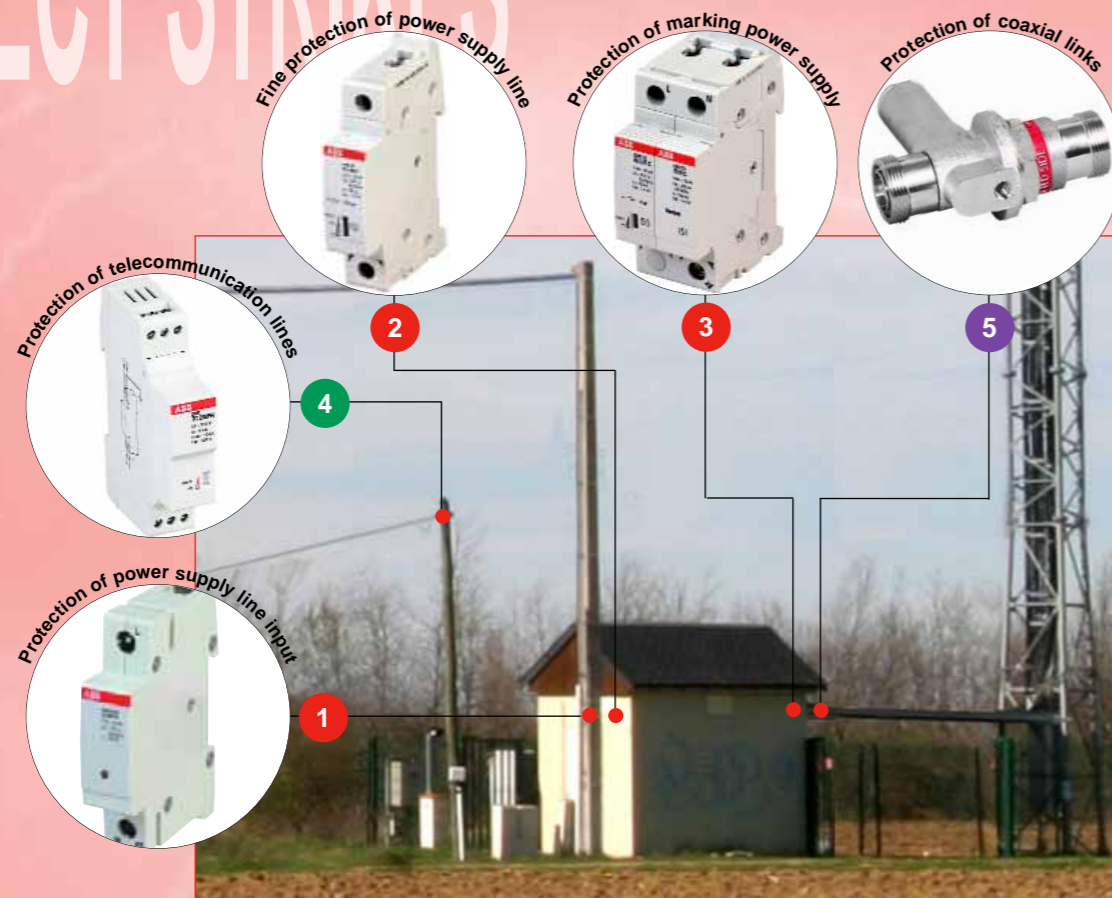
Impacts on the ground, potential rising from the earth

The owner of the line is responsible for protecting the HV transformer and the LV circuit breaker:
 - either the energy distributor (EDF, public corporation, others, etc.)
 - or a large private subscriber / consumer (tertiary industry, others).



INDIRECT STRIKES

Protection of electrical networks against indirect strikes



Protection against indirect lightning strikes on electrical networks must be treated globally.

ABB Soulé offers a complete range of lightning arresters adapted to this approach.

They must be used in accordance with standard practice with a ground network optimized by earthing (low impedance).

The efficiency of protection depends on the quality of ground connections used with the protection devices.

1 Protection of the power supply line input

Description	Reference	Function / comment
OVR T1 25 255-7	2CTB815101R8700	Type 1 lightning arrester

2 Fine protection of power supply line

Description	Reference	Function / comment
OVR T2 40 440 P	2CTB803851R1200	Type 2 lightning arrester

3 Protection of marking power supply line

Description	Reference	Function / comment
OVR T2 1N 40 275 s P TS	2CTB803952R0200	Type 2 lightning arrester Provided with remote signaling connectable to a GTC

4 Protection of telecommunication line

Description	Reference	Function / comment
OVR TC 200 FR	2CTB813814R0000	Analog line

5 Protection of coaxial links

Description	Reference	Function / comment
PHF AN 50 7/16 F/F	8150 02 16	Protection of emission / reception antenna
PHF AN N F/F	8150 02 14	Radio relay system protection

Example of typical installation; please refer to the OVR catalog for other configurations, or to the technical service for further information or a site study.

Protection against direct strikes and earthing connector

Protection against direct strikes on structures such as telecommunication relay towers and other towers, requires the installation of a lightning arrester or a simple tip (near the top) and the installation of an efficient earthing connector (to the ground).

The resistance of the lightning earthing connector must be less than 10 ohms. Appropriate inspection equipment will be used to check this resistance at the time of installation and after, during a maintenance operation (contract).

All verification procedures are described in NF standard C 17-102 for a lightning arrester with a sparkover device and NF standard C 17-100 in the case of a simple tip.



Note : The resistance of the lightning earthing connector must be less than 10 ohms.



OPR references

I (μs)	Description	Order code	Reference	L (m)	Weight (kg)
30	OPR 30 stainless steel	2CTB899800R7000	OPR 30	2.015	2.19
60	OPR 60 stainless steel	2CTB899800R7100	OPR 60	2.015	2.36

Calculation of protected areas

The radius of protection R_p of a OPR is given by the French standard NF C 17-102 of July 1995. It depends on the initiation advance ΔT of the OPR measured in the high voltage Laboratory, on the levels of protection I, II, III calculated according to the lightning risk assessment guide (Appendix B of the

French standard NF C 17-102) and the height h of the lightning conductor over the area to be protected (minimum height = 2m).

OPR radius of protection

Level of protection	I (D = 20m)		II (D = 45m)		III (D = 60m)	
	OPR 30	OPR 60	OPR 30	OPR 60	OPR 30	OPR 60
	Radius of protection R_p (m)					
h (m)						
2	19	32	25	40	28	44
3	28	48	38	59	42	65
4	38	64	50	78	57	87
5	48	79	63	97	71	107
6	48	79	64	97	72	107
8	49	79	65	98	73	108
10	49	79	66	99	75	109
15	50	80	69	101	78	111
20	50	80	71	102	81	113
45	50	80	75	105	89	119
60	50	80	75	105	90	120

The level of protection is calculated according to appendix B of the French standard NF C 17-102.

For the OPR 60, limiting the value of ΔT , that used in the radius of protection calculation, to 60 μs has been validated by the experiment conducted by the members of Gimelec (Group of Industries for Materials for Electrical Equipment and associated Industrial Electronics).