CITEL

SURGE PROTECTORS

FOR

Radiocom Installation

www.citel.fr

"LIGHTNING AND SURGE" PROTECTION OF MOBILE TELEPHONY INSTALLATIONS

Mobile telephony installations are particularly exposed to the direct and indirect effects of lightning: their positions on high points, the presence of pylons (greater risk of impact), and the use of sensitive equipment make mobile telephony stations particularly vulnerable to lightning.

Protective measures

• against direct lightning impact: Use of a capture system (lightning conductor) connected to an appropriately dimensioned earth via a down conductor if required.

• against indirect lightning effects: Lightning arresters must be used for all the installation's incoming and outgoing networks

Lightning Protection Zones (ZPF)

In accordance with standard NF EN 62305-1, the installation requiring protection is divided into zones, called Lightning Protection Zones (ZPF): these successive zones correspond to different levels of severity of lightning strikes:

External zone

• ZPF 0A = zone subject to the risk of direct lightning impact (therefore outside the coverage of the lightning conductor system), to direct lightning current, to surges and to the unattenuated electromagnetic field.

• ZPF 0B = zone protected against direct impact (therefore covered by the lightning conductor system), but which may be subject to surges, to part of the direct lightning current and to the unattenuated electromagnetic field

Internal zones of the installation

• ZPF 1: internal zone where surges are limited by the lightning arrester installation, and where the electromagnetic field is partially attenuated by the structure.

• ZPF 2 to ZPF n: Zones limited by the installation of an additional lightning arrester or by use of a means of attenuation of the electromagnetic field (shielding or Faraday cage).

Lightning arresters

It is essential to install lightning arresters in all the external networks to guarantee the installation's reliability. In addition, the presence of a lightning conductor structure requires use of Type 1 lightning arresters, the function of which is to draw off part of the direct lightning current. All networks are concerned:

• Low-voltage network (monophase or triphase)

• 48 V DC power network

• Coaxial cables

• Telecom links

Reference standards:

NF EN 60305-x: Lightning Protection of installations

NF EN 61643-11: Lightning arresters for low-voltage networks

NF EN 61643-21: Lightning arresters for communication networks

UIT T rec.K56: Lightning protection of mobile telephony installations

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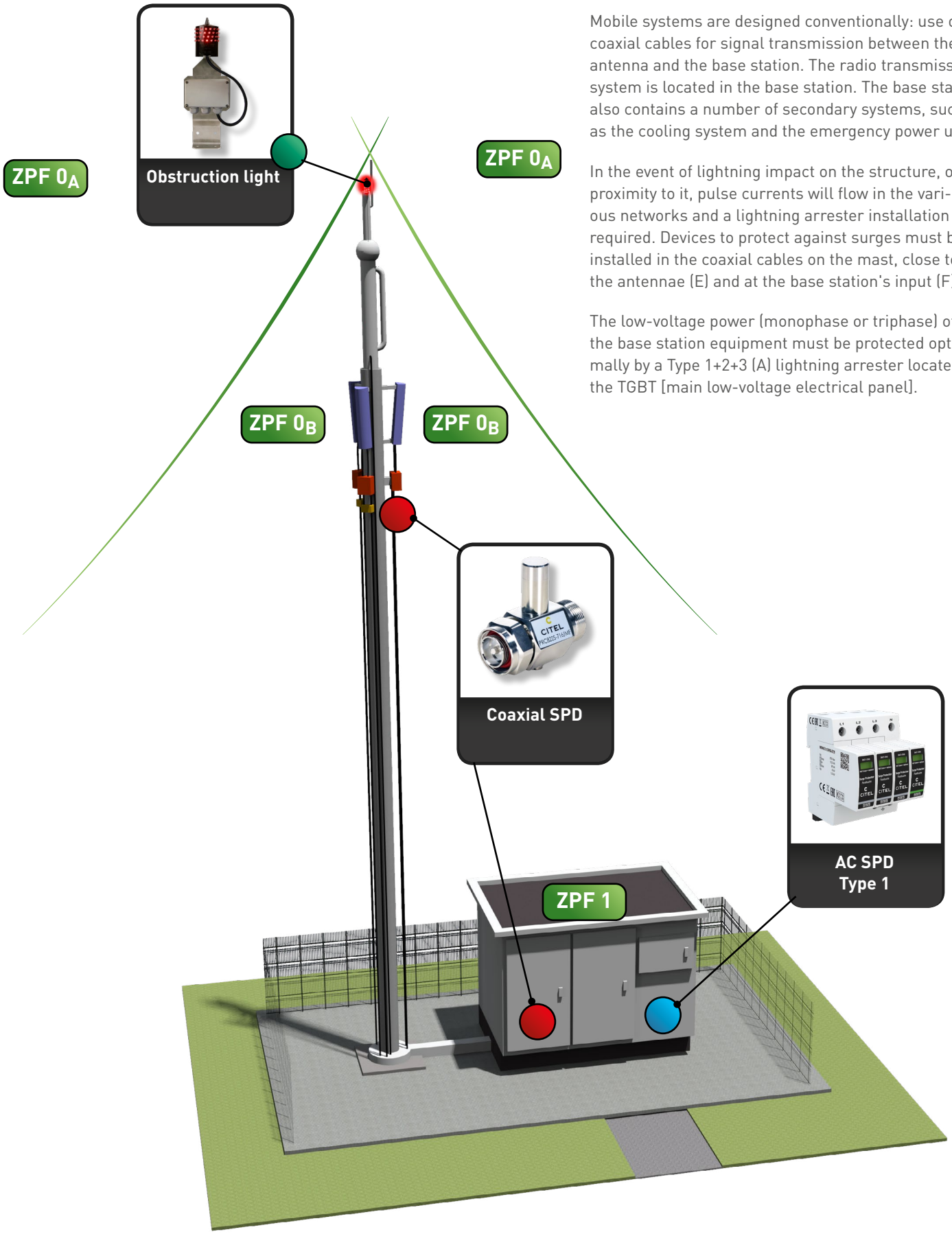
CONVENTIONAL MOBILE TELEPHONY STATION

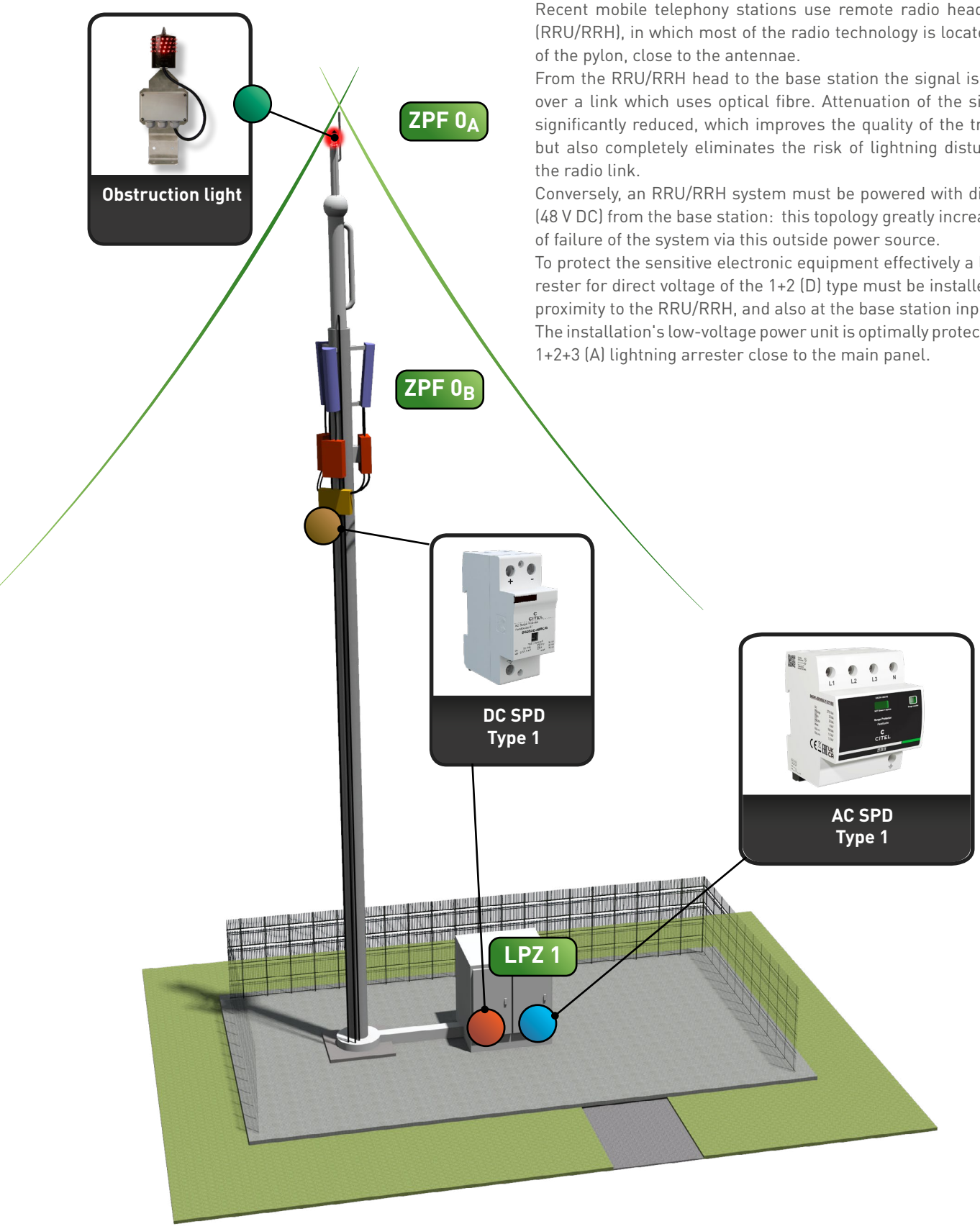


Mobile systems are designed conventionally: use of coaxial cables for signal transmission between the antenna and the base station. The radio transmission system is located in the base station. The base station also contains a number of secondary systems, such as the cooling system and the emergency power unit.

In the event of lightning impact on the structure, or in proximity to it, pulse currents will flow in the various networks and a lightning arrester installation is required. Devices to protect against surges must be installed in the coaxial cables on the mast, close to the antennae (E) and at the base station's input (F).

The low-voltage power (monophase or triphase) of the base station equipment must be protected optimally by a Type 1+2+3 (A) lightning arrester located in the TGBT [main low-voltage electrical panel].

SYSTEM WITH REMOTE RADIO HEAD
(RRU/RRH)

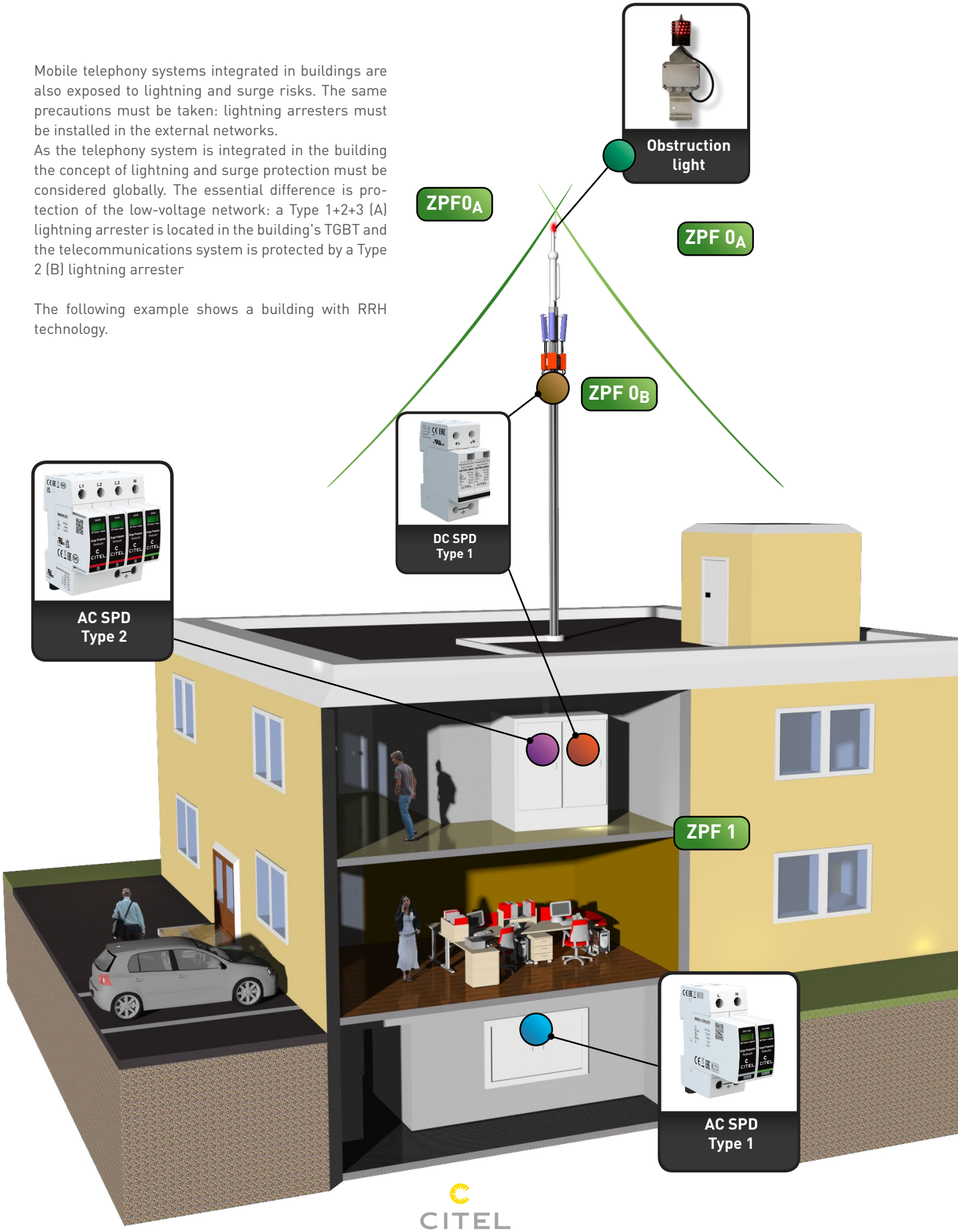


Recent mobile telephony stations use remote radio head technology (RRU/RRH), in which most of the radio technology is located at the top of the pylon, close to the antennae.
From the RRU/RRH head to the base station the signal is transmitted over a link which uses optical fibre. Attenuation of the signal is thus significantly reduced, which improves the quality of the transmission, but also completely eliminates the risk of lightning disturbance over the radio link.
Conversely, an RRU/RRH system must be powered with direct current (48 V DC) from the base station: this topology greatly increases the risk of failure of the system via this outside power source.
To protect the sensitive electronic equipment effectively a lightning arrester for direct voltage of the 1+2 (D) type must be installed directly in proximity to the RRU/RRH, and also at the base station input (C).
The installation's low-voltage power unit is optimally protected by a Type 1+2+3 (A) lightning arrester close to the main panel.

MOBILE SYSTEMS ON BUILDINGS
(CONVENTIONAL OR RRU/RRH)

Mobile telephony systems integrated in buildings are also exposed to lightning and surge risks. The same precautions must be taken: lightning arresters must be installed in the external networks.
As the telephony system is integrated in the building the concept of lightning and surge protection must be considered globally. The essential difference is protection of the low-voltage network: a Type 1+2+3 (A) lightning arrester is located in the building's TGBT and the telecommunications system is protected by a Type 2 (B) lightning arrester

The following example shows a building with RRH technology.



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SPD FOR 230/400 V LOW-VOLTAGE NETWORK

Type 1 lightning arresters are required at the source of the low-voltage installation.
CITEL offers ranges of lightning arresters which can be selected according to:
- type of LV network (monophase or triphase)
- total required impulse current (Itotal: 25 to 100 kA)

Additional functions such as remote reporting of disconnection or unpluggable components are additional criteria determining choice.

DAC1-13VG-31-275

DACN1-25CVGS-31/SC

CITEL reference	DAC1-13VGS-11-275	DAC1-13VGS-31-275	DS252VG-300/G	DACN1-25CVGS-275/SC
Type of network	Monophase* 230 V	Triphase* 230/400 V	Monophase* 230 V	Triphase+N 230 V
Type of lightning arrester	T 1+2+3	T 1+2+3	T 1+2+3	T 1+2+3
Max. operating voltage	275 V	275 V	255 V	275 V
Nominal discharge current	20 kA	20 kA	20 kA	25 kA
Impulse current 10/350 µs/pole	12.5 kA	12.5 kA	25 kA	25 kA
Total impulse current 10/350 µs	25 kA	50 kA	50 kA	100 kA
Connection	Terminal set screw 25 mm² max.	Terminal set screw 25 mm² max.	Terminal set screw 35 mm² max.	Terminal set screw 35 mm² max.
Installation	DIN rail	DIN rail	DIN rail	DIN rail
Dimensions (width)	36 mm	72 mm	72 mm	72 mm
Remote reporting	Yes	Yes	Yes	Yes
Unpluggable modules	Yes	Yes	No	No

**) available in 120 V AC or 120/208 V versions*

Type 2 lightning arresters are required in the equipment requiring protection (rectifier). Sometimes they are incorporated by the equipment manufacturer. CITEL offers ranges of Type 2 lightning arresters which can be selected according to:
- type of LV network (monophase or triphase)
- Technology: VG (optimised version for optimum efficiency and reliability or MOV (standard).

DAC50VGS-11-275

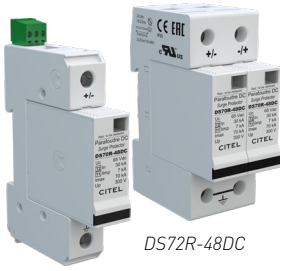
DAC50VGS-31-275

CITEL reference	DAC50VGS-11-275	DAC50VGS-31-275	DAC50-11-275	DAC50-31-275
Type of network	Monophase* 230 V	Triphase* 230/400 V	Monophase* 230 V	Monophase* 230 V
Type of lightning arrester	T 2+3	T 2+3	T 2	T 2
Max. operating voltage	275 V	275 V	275 V	275 V
TOV without disconnection	440 V AC	440 V AC	335 V AC	335 V AC
Nominal discharge current	20 kA	20 kA	20 kA	20 kA
Maximum discharge current	50 kA	50 kA	50 kA	50 kA
Connection	Terminal set screw 25 mm² max.	Terminal set screw 25 mm² max.	Terminal set screw 35 mm² max.	Terminal set screw 35 mm² max.
Installation	DIN rail	DIN rail	DIN rail	DIN rail
Dimensions (width)	36 mm	72 mm	36 mm	72 mm
Remote reporting	Yes	Yes	Yes	Yes
Unpluggable modules	Yes	Yes	No	No

**) available in 120 V AC or 120/208 V versions*

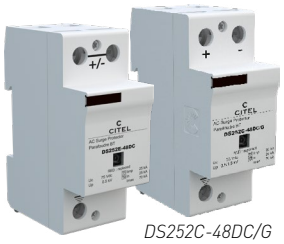
SPD FOR 48 V DC NETWORK

Type 1 lightning arresters are required in RRU/RRH sites in the 48 V DC power network. CITEL offers ranges of lightning arresters which can be selected according to the required total impulse current (Itotal:14 or 50 kA)
Additional functions such as remote reporting of disconnection or unpluggable components are additional criteria determining choice.



DS72R-48DC

DS71RS-48DC



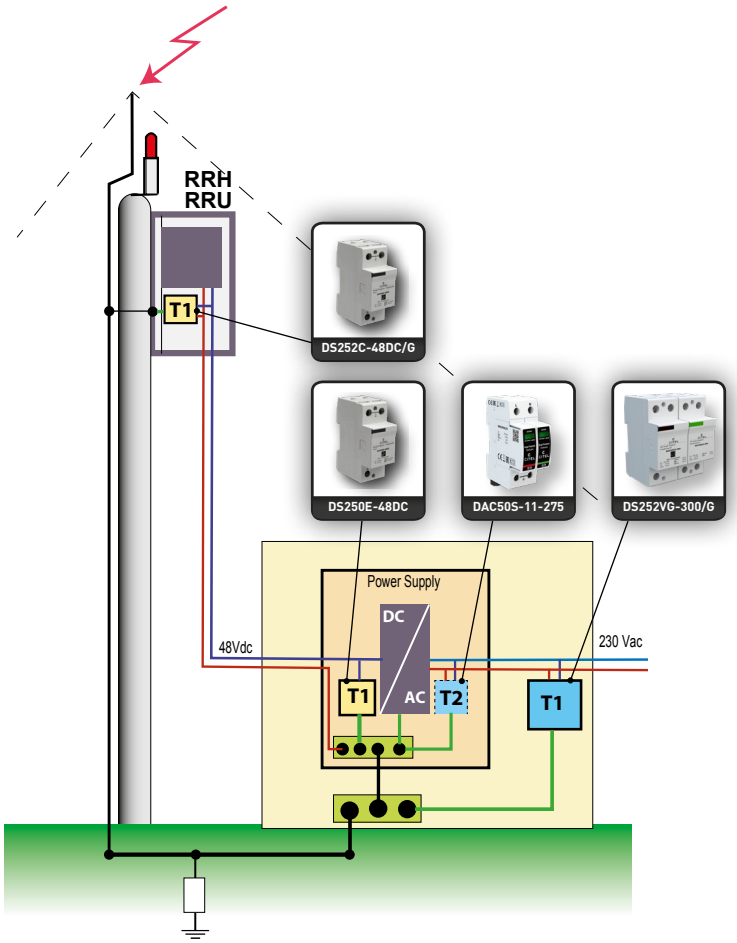
DS252C-48DC/G

DS250E-48DC

CITEL reference	DS71R-48DC	DS72R-48DC	DS250E-48DC	DS252VG-48DC/G
Type of network	48 V DC	48 V DC	48 V DC	48 V DC
Type of lightning arrester	T 1+2 unipolar	T 1+2 bipolar	T 1+2 unipolar	T 1+2 bipolar
Configuration	(-/PE)	(+)/PE) (-/PE)	(-/PE)	(+/-) (+/PE)
Max. operating voltage	65 V	65 V	75 V	75 V
Nominal discharge current	30 kA	30 kA	25 kA	30 kA
Impulse current 10/350 µs/pole	7 kA	7 kA	25 kA	25 kA
Total impulse current 10/350 µs	-	14 kA	-	50 kA
Connection	Terminal set screw 25 mm² max.	Terminal set screw 25 mm² max.	Terminal set screw 35 mm² max.	Terminal set screw 35 mm² max.
Installation	DIN rail	DIN rail	DIN rail	DIN rail
Dimensions (width)	18 mm	36 mm	36 mm	36 mm
Remote reporting	Option DS71RS-48DC	Option DS72RS-48DC	Yes	Yes
Unpluggable modules	Yes	Yes	No	No

EXAMPLE

Protection of AC and DC ports of a 4G site (RRH-RRU) with maximum risk protection.



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COAXIAL SPD

P8AX

PRC

CITEL reference	P8AX range	PRC range
Application	protection of coaxial ports	protection of coaxial ports
Technology	Gas spark arrester	Quarter-wave plate
Connection technology	N, TNC, BNC, F, SMA, 7/16	N, TNC, 7/16
Maximum power	up to 500 W	1500/2500 W*
Bandwidth	> 3 GhZ*	800-6000 MhZ*
Nominal discharge current 8/20 µs	5 kA	25/50 kA*
Max. discharge current 8/20 µs	20 kA	50/100 kA*
Impulse current 10/350 µs	2.5 kA	25/50 kA*
Installation and earthing	Wall crossing	Wall crossing

**) depending on the models and connectors*

OBSTA OBSTRUCTION LIGHTING

OBSTA reference	NAVILITE range
Characteristics	Electro-Luminescent Diode
Supply voltage	48 V DC to 240 V AC
Surge protection	Yes
Luminous intensity	> 10 candelas
Electric current	70 to 370 mA
Power	< 4.4 to < 6 W
Typical lifetime	100,000 h
OACI	regulations

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