



Le réseau  
de transport  
d'électricité

# - TAO system - Technical Specification for access to the TAO IP-VPN service

V2.1

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## Table of Contents

1.	General provisions.....	4
1.1.	Purpose of the document.....	4
1.2.	Reference documents.....	4
1.3.	Evolution of the technical specifications .....	5
2.	Telecommunications resources .....	6
2.1.	Eligibility for IP-VPN TAO technical system .....	6
2.2.	Installation solution.....	6
2.3.	Eligibility of the Access Line .....	6
2.4.	Limitations of liability.....	7
2.5.	Connecting to the operator network.....	7
2.5.1.	Pre-installation Operations for an Access Line.....	7
2.5.2.	Special cases of electrical sites.....	8
3.	Transmission network.....	9
3.1.	Telecommunications links .....	9
3.2.	Technical specifications .....	9
3.2.1.	VPN Topology.....	9
3.2.2.	Routing.....	10
3.2.3.	Protocols used .....	11
3.2.4.	Connection interface .....	11
3.2.5.	Filtering .....	11
3.2.6.	Flow and Priorities (QoS).....	11
3.2.7.	Addressing plan .....	11
3.2.8.	Configuration for TAO system connection.....	12
3.3.	Robustness.....	13
3.3.1.	Service Availability .....	13
3.3.2.	Service Recovery Time Guarantee .....	13
4.	Environmental stress on the User's site.....	14
4.1.	Equipment.....	14
4.1.1.	SDSL Access Link.....	14
4.2.	Installation space.....	15
4.3.	Installation cabinet.....	15
4.4.	Equipment power supply .....	16
4.5.	Telecom distributor .....	16
4.6.	Connections.....	16
4.7.	Overall diagram for connecting a User's site .....	17
5.	Security .....	17
6.	Installation process and incident management .....	18
6.1.	Installation .....	18
6.2.	Incident management .....	19
7.	Definitions and glossary of abbreviations.....	21
7.1.	Definitions .....	21
7.2.	Glossary of Abbreviations.....	21

Appendix 1: Information on the PARTNER power system control centre for the telecom connection.....	22
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## 1. General provisions

### 1.1. Purpose of the document

This document is intended for users of the system for Automated Transmission of Balancing Orders (TAO) implemented by RTE. This system is implemented to transmit all Balancing Orders, so it is intended for all Balancing Service Providers.

This document sets out the technical specifications which the User must meet for the connection of its site to the RTE transmission network, in particular:

- the requirements for the installation of the telecommunications resource and transmission equipment to be implemented on the User's website,
- the characteristics and configuration of the termination equipment for connection to the transmission network,
- the limits of ownership and responsibility for the various equipment and infrastructure,
- the installation and operation of the transmission equipment on the User's site.

Compliance with the requirements for the installation of the telecommunications carrier and transmission equipment by the User constitutes a requirement for compliance with RTE's deadline commitments set out in § 6.1.

### 1.2. Reference documents

The table below lists the reference documents cited in this Implementation Guide:

No.	Document Title	Source
[1]	Orders of 2 April 1991 and 17 May 2001 laying down the requirements for connection and protection of Electrical Sites	
[2]	Implementation guide for exchanges with the TAO system	<a href="https://www.services-rte.com/en/learn-more-about-our-services/becoming-a-balancing-service-provider.html">https://www.services-rte.com/en/learn-more-about-our-services/becoming-a-balancing-service-provider.html</a>
[3]	Rules on the Scheduling, Balancing Mechanism and recovery of balancing expenses	
[4]	TAO System - Installation methods associated with operational processes ("Accompanying Guide")	

This document refers to any discrepancies in these reference documents.

### 1.3. Evolution of the technical specifications

Each of the technical specifications in this document may be reviewed on the initiative of RTE. Unless otherwise stated regarding the time limits, these revisions shall be Notified to Users at least six (6) months before their operational commissioning.

## 2. Telecommunications resources

### 2.1. Eligibility for IP-VPN TAO technical system

The service providers eligible for the TAO IP-VPN telecommunications system for the transmission of Balancing Orders are:

- Balancing Service Providers holding a contract to make available FRR and RR capacity for a Site;
- Balancing Service Providers that have subscribed to a service offer for access to the TAO IP-VPN system.

Service providers eligible for the TAO IP-VPN telecommunication system with a contract to make available FRR and RR capacity must subscribe to a service offer for access to the TAO IP-VPN system as soon as the number of Sites to be connected to the system is greater than or equal to two.

### 2.2. Installation solution

In order to enable the transmission of information flows between the User's site and the RTE IS via the TAO IP-VPN telecommunication system, RTE specifies:

- the telecommunications solution to be implemented;
- the equipment to be installed on the User's website.

The installation of the TAO IP-VPN telecommunication device consists of connecting the User's site to the RTE IS via an RTE network infrastructure, relying in particular on the offer of the Private Virtual Network IP, also known as VPN IP, from a telecommunications operator with which RTE has contracted an offer.

This offer is broken down as follows:

- 1 Access Link or several VPN IP Access Links installed on the User's site or sites,
- 1 IP connectivity through a VPN allowing the exchange of flows between the User's site and the RTE IS.

### 2.3. Eligibility of the Access Line

Prior to the delivery of the TAO VPN IP Access Line, the telecommunications operator carries out a theoretical study of eligibility for RTE, depending on the service characteristics of the User's website.

In order to carry out this study, the User undertakes to provide to RTE with the exact address of the site, as well as a number for the Commuted Phone Network aimed at connecting the VPN IP Access Link to the installation premises (see §4.2 and §4.3) where the materials will be installed on the User's website (see §4.1). To do this, the User contacts his Customer Relationship Officer, and uses the form attached in Appendix 1.

The User's Site must be located within a European Union country.

In return, and after a period of 6 weeks<sup>1</sup>, RTE shall inform the User of the eligibility of the site, as well as the theoretical number of copper pairs used for VPN IP access. This connection mode has no impact on the RTE side.

In case of non-eligibility of the site, RTE shall inform the User of the possible technical provisions. If the User wishes to confirm the connection of the said site, the costs shall be borne by the User.

## 2.4. Limitations of liability

The ownership and liability limits between RTE and the User at the site level are located outside the operator's (CE) router(s) at the Ethernet port (the RJ45 cable is the User's property).

The overall layout of the User's site is illustrated in §4.7 with a precise representation of the boundaries of ownership/liability between RTE and the User.

The User is responsible for specifying, designing and implementing the ad hoc equipment and means of communication located within its area of responsibility. This equipment must be compatible with the solution presented in this document, no specific adaptation to the User's site can be implemented.

## 2.5. Connecting to the operator network

### 2.5.1. Pre-installation Operations for an Access Line

Prior to the installation by the operator of the Access Lines, the User undertakes to:

- provide planned aerated sites (see §4.2 & §4.3), as well as the power supply in accordance with the standards used in the country in which the User's site is located and the earthing necessary for the functioning of the Equipment on the User's site;
- setting up the internal service;
- the provision of the cable between the router installed by the Operator (CE) and the User's Equipment;
- the provision, within the framework of the prevention plan made for each User's site, of information concerning the risk factors for the installation of routers.

The User will ensure that the available cross-zonal capacity (number of copper pairs or optical cross-zonal capacity) on the Telecom entry (possibly over-insulated) is sufficient for

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<sup>1</sup> For sites located in France  
Telecommunications resources

the connection of the VPN IP Access Link. For information purposes, for a connection using copper technology, the service can be delivered on 1, 2 or 4 copper pairs depending on the access eligibility (see §4.6 and §4.7).

### 2.5.2. Special cases of electrical sites

For electrical sites, the User shall, in accordance with the regulations in force (see document [1]), ensure the protection of telecommunications facilities serving sites against the risks resulting from the increase of the earth potential of the said sites during electrical defects and the safety of personnel using or intervening in these installations.

In particular before the operator installs the Access Links on an electrical site the User undertakes to perform the following operations:

- The installation of protective devices against transient electrical surges (surge arresters) to which the power supply and the Access Link will be connected in order to protect the connection to the operator's network.
- Supply and installation of a protective chassis and DIG (type TDSL) on the copper pairs used by the telecommunications resource.

The User will install a protective frame for the connection of the Galvanic Isolation Devices (type TDSL) onto the copper pairs used by the telecommunications carrier. The supply of the Galvanic Isolation Devices will be carried out by the Contractor with suppliers approved by the operator:

Supplier	Throughput
DEGREANE HORIZON	TDSL Translator
MADE-SA	HELIOS F



### 3. Transmission network

#### 3.1. Telecommunications links

The User's site is intended to be connected to the RTE IS via an IP-VPN network operated on behalf of RTE.

Access to this network is materialised on the User's website by a protected Access Link.

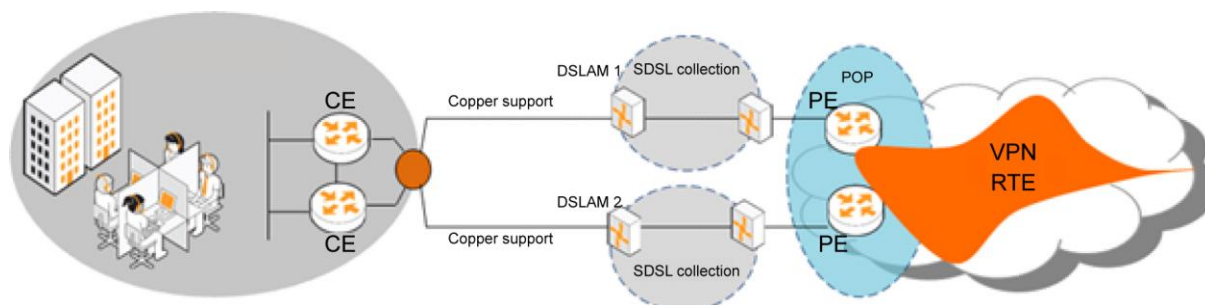
This category of Access Link (for a single site) consists of two telecommunication channels based on two transmission resources and two routers.

The transmitters are identical in terms of technology and throughput.

The Access Link works in nominal/standby mode.

The transmission resources implemented depend on the eligibility of the site for a technology and requirements in terms of throughput.

Nominal Access		Relief Access	
Support	Throughput	Support	Throughput
SDSL	2 Mb/s	SDSL	2 Mb/s



#### 3.2. Technical specifications

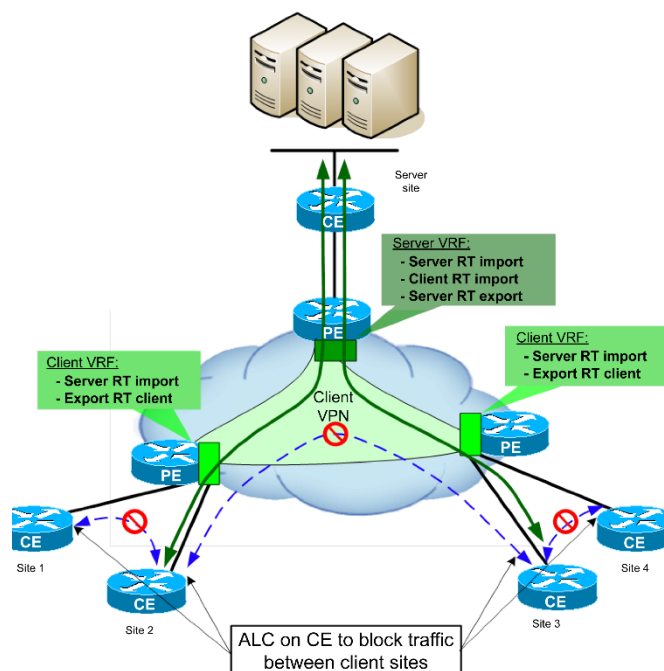
##### 3.2.1. VPN Topology

The "Client Server" architecture is used to implement a VPN that only allows traffic between Stakeholders sites (called client sites) and sites hosting RTE applications to be accessed by service providers (called server sites).

The "Client Server" concept allows:

- communication between "Server" sites,
- communication between "Customer" sites and "Servers" sites,
- prevents communication between "Customer" sites (directly between them and by rebound via "Servers" sites).

The "Client Server" model does not allow routing between "Client" remote sites (even via the server site).



**Figure 1: "Client Server" configuration principle**

### Architectural principle:

2 different RT (Route Targets) are needed to implement this architecture:

- 1 RT identifying client site routes,
- 1 RT identifying server site routes.

In this model, the VRF of the server and client sites are not standard, the VRF "Server" imports the RT Client and the RT Server and exports only the RT Server. This VRF contains the routes of other server sites and client sites.

The VRF "Client" imports only the Server RT and exports only with the Client RT. Thus, it only learns the routes of the server and local sites to the site but not those of other client sites.

Access lists (ACLs) are systematically set up on the CEs of client sites to filter the remote inter-CE traffic. Indeed, when several "client" sites are attached to the same VRF of the same PE, routing is managed locally on the PE, allowing direct communication between these two sites despite the implementation of the "Client Server" configuration.

### 3.2.2. Routing

The routing mode selected is a static routing.

Only the subnet assigned by RTE to the User's site (see §3.2.7) is routed in the VPN.



### 3.2.3. Protocols used

Access Links use the following standard protocols:

- **RFC 894** Ethernet LAN Protocol
- IPv4 Protocol: **RFC 791**,
- VRRP Redundancy Protocol: **RFC 5798**..

The VRRP protocol aims to increase the availability of the default gateway for hosts on the same network. This protocol is implemented as part of the installation of a Rescue Access Link.

The VRRP address is used by the User as the gateway to the VPN IP service.

### 3.2.4. Connection interface

The connection interface is 100 Mbps Fast Ethernet. The self-negotiation Ethernet mechanism is configured by default.

### 3.2.5. Filtering

An extended Access Control List will be installed as input on the Ethernet interface of the User's site operator router.

It will only pass through flows that have as their source addresses the RTE addresses assigned to the User's site and have as their destination the addresses of the applications of the RTE IS to be used by the User.

### 3.2.6. Flow and Priorities (QoS)

No QoS mechanism that handles the priority of flows within this VPN in case of network congestion on the Access Link is implemented.

### 3.2.7. Addressing plan

A subnet of 16 addresses will be assigned for each User site wishing to benefit from the IP VPN service.

- 1 network address,
- 14 hosts addresses,
- 1 broadcast address.



In the case of a Rescue Access Link, the first 3 host addresses are used for the LAN addressing of the 2 CEs:

- 1 CE1 LAN address,
- 1 CE2 LAN address,
- 1 VRRP LAN address.

This addressing plan will be provided and imposed by RTE (no adaptation to the address plan specific to the User's site is feasible) after the eligibility study (§ 6.1).

### 3.2.8. Configuration for TAO system connection

The TAO system, whose implementation methods are detailed in document [2], is accessible at the URL below through the VPN IP presented in this document:

Solution for access to RTE's IS	Connection URL
<b>TAO IP-VPN</b>	<a href="https://tao.ipvpn.services.rte-france.com/tao">https://tao.ipvpn.services.rte-france.com/tao</a>

In order to access this URL, the User will have to implement one of the following two solutions:

1. Resolving the URL by contacting one of the following Domain Name System (DNS) servers made available by RTE through the TAO VPN IP network:

	IP Address	Connection Port
<b>DNS Server #1</b>	10.162.128.10	53
<b>DNS Server #2</b>	10.162.128.11	53

2. Resolving the URL by filling in the following host in the User's DNS server:

Hostname	Associated IP Address	Connection Port
tao.ipvpn.services.rte-france.com	10.162.128.21	443

RTE recommends the implementation of the first solution.

### 3.3. Robustness

#### 3.3.1. Service Availability

The availability rate of an Access Link is defined by the cross-zonal capacity for a site to access the service.

On a secured Access Link, the service availability rate is 99.90% over three months.

#### 3.3.2. Service Recovery Time Guarantee (GTR)

The GTR is the maximum time (in hours) between opening an incident ticket by RTE with the Operator and returning to a nominal state of the Access Line, evidenced by the closing of the incident ticket.

The GTR is 4 hours and can be applied over the following hourly range "24x7 Range (24/7)".

In the particular case requiring the replacement of the network access operator's equipment, the recovery period shall be subject to the conditions for access to the equipment described in §4.2.

## 4. Environmental stress on the User's site

### 4.1. Equipment

The connection of the VPN IP Access Link to the User's site is made by means of one or two pieces of network access operator (CE) equipment, supplied by the Telecommunications Operator on behalf of and under the responsibility of RTE. The number and nature of operator equipment is determined by the Telecommunications Operator according to the eligibility of the User's website.

In the event that a secure Access Link is implemented, the 2 CEs must be installed in the same bay in order to allow the installation of a copper ring between the 2 pieces of equipment.

The characteristics of the equipment are as follows:

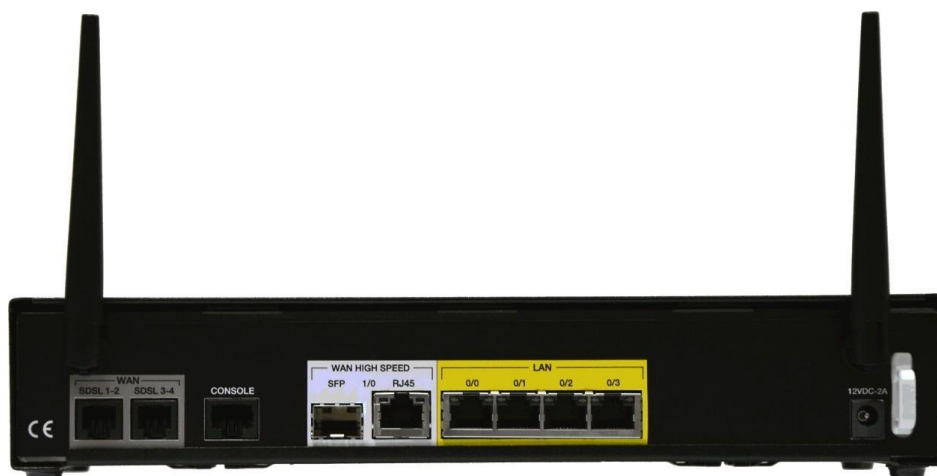
#### 4.1.1. SDSL Access Link

##### *Model LBB210*

- **230V~50Hz permanent supply**

List of interfaces:

- **WAN SDSL ports:** WAN SDSL1-2 and SDSL 3-4
- **Console port:** CONSOLE
- **WAN 100/1000 Ethernet SFP port:** WAN HIGH SPEED 1/0 SFP
- **WAN 10/100/1000 Ethernet RJ45 port:** WAN HIGH SPEED 1/0 RJ45
- **LAN 10/100/1000 Ethernet RJ45 switch 4 ports:** LAN 0/0, 0/1, 0/2, 0/3
- Connection for External Power Supply: 12V-2A
- Holder for power supply cable
- 2 fixed antennas for Wi-Fi 802.11 b/g/n



## Technical specifications:

<b>Height</b>	50 mm
<b>Width</b>	276 mm
<b>Depth (without Wi-Fi antennas)</b>	147 mm
<b>Depth (with Wi-Fi antennas)</b>	157 mm
<b>Casing</b>	Metal
<b>Weight</b>	1400 g
<b>Maximum power consumption</b>	22 Watt
<b>Heat dissipation</b>	20 Watt

### 4.2. Installation space

For any type of site (electrical or tertiary), the User undertakes to make available to RTE and the Telecommunications Operator a sheltered space, fitted and free of dust for the installation of Operator equipment, no later than 3 weeks before the agreed date of installation of the VPN IP Access Link on the User's site.

The User undertakes to provide access, **with an accompanying person**, to these premises to the Telecommunications Operator's staff, upon request made by RTE or the Operator with a notice period of 48 hrs.

The layout of the premises must be in accordance with current standards and must allow normal conditions for the installation and maintenance of the Operator's equipment. In particular, the User shall ensure that:

- The equipment will not be installed near a heat source, and the User will ensure that the equipment ventilation systems are not obstructed.
- The room temperature shall be between +15 and +30°C.
- The humidity in the room shall be between 10 and 90% non-condensed.

In the hypothesis where connection of the equipment requires the removal or disconnection of existing equipment, the User shall authorise and/or obtain the necessary authorisations for such withdrawal or disconnection within a reasonable time and shall provide the telecommunications operator with all the assistance necessary to carry out such withdrawals or disconnections.

### 4.3. Installation cabinet

The User shall make available in the installation room a Telecom cabinet equipped with plates allowing the installation of operator equipment.

The size of the cabinet and the number of plates should take into account the number of pieces of operator equipment to be installed and their characteristics (see § 4.1).

The Telecom cabinet shall be earthed to the site and equipped with an earthing strip for operator equipment and an RJ45 plug strip.

#### 4.4. Equipment power supply

The User makes available on its site a 230V secured power supply that complies with the standards in force in France, through a sufficient number of electrical outlets, in the Telecom cabinet. The User must comply with these standards, including where the Site is located in another EU country.

This power supply will be sized to support at a minimum the power of the operator equipment (22 VA per piece of equipment).

The power characteristics of the devices are detailed in §4.1.

#### 4.5. Telecom distributor

The User shall make available in the Telecom room of the User's site a Telecom arrival point, of the distributor type, for the of IP VPN operator Access Link. Wiring will be made from this distributor to the RJ45 plug strip installed in the Telecom cabinet.

If the User's site is an electrical site, the User will use RIM HF strips on the distributor for the earthing of shielding, and HF jumpers.

#### 4.6. Connections

The User shall carry out on his site all the computer and network wiring and electrical wiring necessary for connection:

- Between the User's equipment and the operator's equipment
- Between the operator equipment and the site's over-insulated inlet.

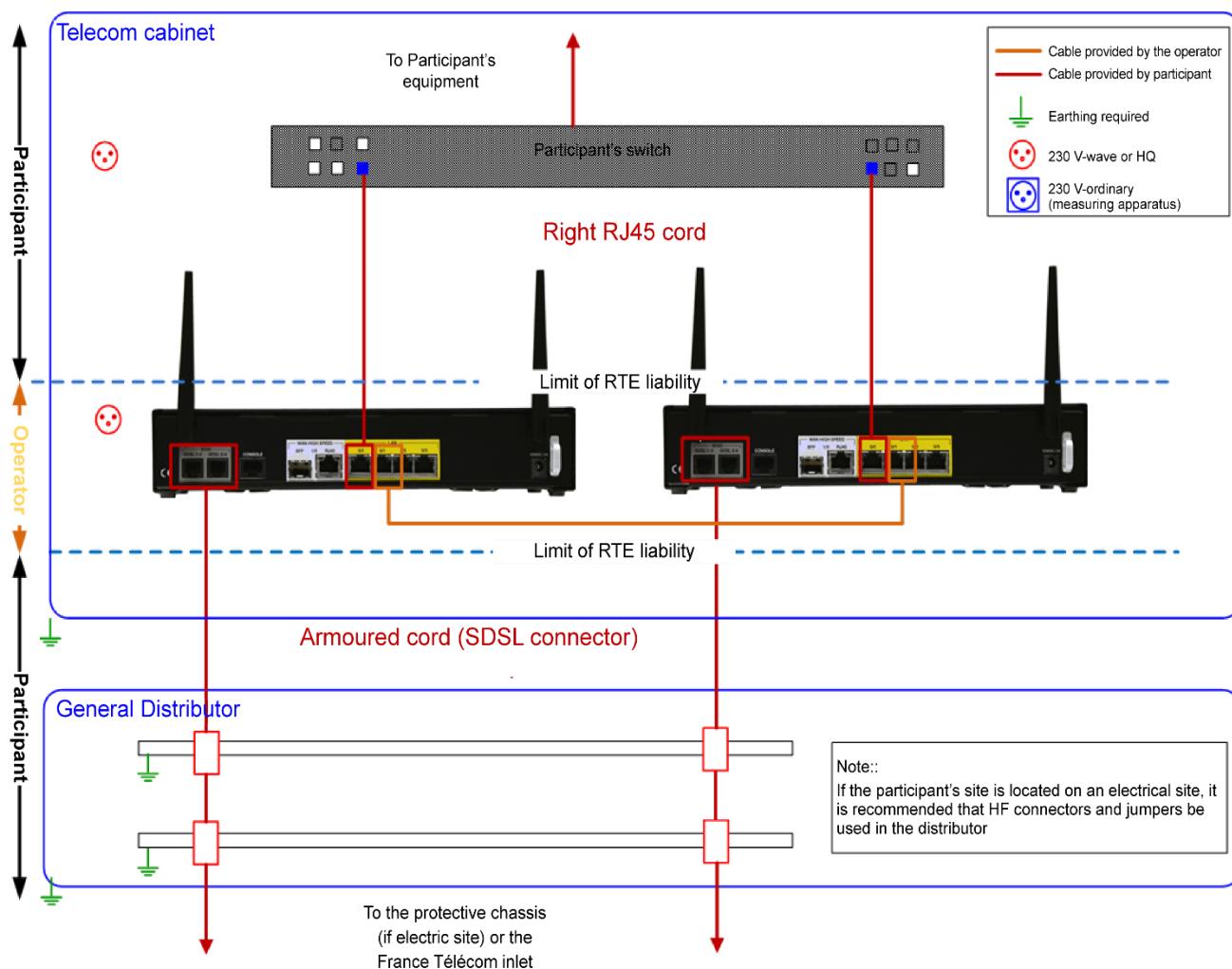
Cables used for digital data links will generally be twisted, armoured and minimum category 5. It is recommended to use cables with braided shielding (STP or SFTP) including Ethernet cables (the FTP aluminium foil screen is not suitable). The connectors shall be metallic or metallised to ensure electrical continuity where possible.

By application, the RJ45 cables used to interconnect the different equipment will be of type 5 minimum, according to the EIA/TIA 568 standard.

The operator's CE connection to the equipment of the User's site is made via Ethernet with a user-supplied RJ45 cable (crossed or straight according to the connected equipment). The configuration of this Ethernet connection will be under self-negotiation on both sides for speed and duplex (expected negotiation of 100Mb/s Full-Duplex).



#### 4.7. Overall diagram for connecting a User's site



## 5. Security

Equipment connected to this local area network must be in premises with controlled and regulated access, access must be prohibited to any unauthorised person, unless permanently accompanied.

RTE must be able to audit compliance with these requirements.

## 6. Installation process and incident management

### 6.1. Installation

The installation of a IP VPN line on a site in **metropolitan France** follows the following steps:

1. The User emails a request to his CRC for a TAO IP VPN line by returning the information collection sheet attached in Appendix 1.
2. Within about 2 weeks, notification by email will be sent to the User on the acceptance of his request and the validity of the data provided.
3. Within 6 weeks of this notification, there will be an eligibility study (see § 2.3).  
Following this eligibility study:
  - In case of eligibility RTE shall inform the Site User, as well as the theoretical number of copper pairs used for VPN IP access,
  - In case of non-eligibility of the site, RTE shall inform the User of the possible technical provisions.
    - If the User wishes to confirm the connection of the said site, the costs shall be borne by the User. The User will then have to notify RTE of the installation of these technical provisions in order to proceed to the next step.
    - If the User wishes to modify the site to be connected, a new procedure will have to be initialised by the User for this new site.
4. Once the eligibility has been notified by RTE, an appointment will be made by the Operator with the technical contact person defined above in order to complete the installation of the equipment within 6 weeks of this notification. The installation will be completed within 9 weeks of this notification.
5. Upon installation of the equipment, the Operator will notify RTE of the installation of the equipment by email, who will then notify the User of its authorisation to use the line within 2 weeks.

Note: In order for the Operator to carry out complete service acceptance by performing toggle tests between the nominal line and the standby line, it is necessary for the User to connect the Operator's equipment to his local area network (LAN) on the day of installation.

For the installation of a VPN IP line on a site **outside metropolitan France** the process will be the same, but no indicative deadline can be specified by RTE.

## 6.2. Incident management

In the event of an incident on the IP VPN TAO telecom link, the User must follow the instructions mentioned in § "Loss of an RTE-Balancing Service Provider telecom link or loss of Balancing Service Provider IS" in the reference document [4].

The incidents are on the TAO VPN IP line and fall into three categories per RTE:

- User-detected incident
  - This case corresponds to the User's detection of malfunctioning of the TAO system.
  - The user opens incident with the RTE Client IS Hotline<sup>2</sup> indicating the following information:

Contact details	
Item	Definition
Contact surname	<i>Surname of the person reporting the incident</i>
Contact first name	<i>First name of the person reporting the incident</i>
Contact company	<i>Name of the company of the person reporting the incident</i>
Contact telephone number	<i>Telephone number of the person reporting the incident</i>
Contact email address	<i>Email address of the person reporting the incident</i>
TAO connection mode	
Item	Definition
Name of order recipient	<i>Name of the order receiver for which the caller reports the incident</i>
Connection interface	<i>Interface used in nominal mode by this RO to connect to TAO, 2 interfaces are available: Web HMI or M2M.</i>
VPN IP information	
Item	Definition
TAO VPN IP site address	<i>The geographic address of the site hosting the TAO VPN IP physical devices</i>
Opening hours of the site	<i>Opening hours of the site above</i>
VPN IP local contact person's surname	<i>Surname of the contact person responsible for the site hosting the physical devices of the TAO VPN IP</i>
VPN IP local contact person's first name	<i>First name of the contact person responsible for the site hosting the physical devices of the TAO VPN IP</i>
VPN IP local contact person's telephone number	<i>Telephone number of the contact person responsible for the site hosting the IP VPN TAO physical devices</i>
Email address local IP VPN contact	<i>Email address of the contact person responsible for the site hosting the physical devices of the IP VPN TAO</i>

<sup>2</sup> The phone number to contact the RTE Client IS Hotline is +800 80 50 50 50.

- After analysis by RTE, if the origin of the malfunction originates from the IP VPN line of the User's site, the Operator contacts the "IP VPN Local Contact Person" defined above in order to resolve the malfunction. The "IP VPN Local Contact Person" must have access to the IP VPN line equipment of the User's site or be able to provide access to such equipment to the Operator's staff. Any delays due to a lack of response from the "IP VPN Local Contact Person" during this contact will not be taken into account in the calculation of the system availability indicators (see §3.3.1).
  - After the Operator has resolved the incident, the RTE Client IS Hotline contacts the User to confirm resolution of the malfunction.
- Incident detected by the Operator
    - This situation corresponds to the Operator detecting a malfunction of the VPN IP line not detected by the User (e.g. toggles to the standby router).
    - The Operator contacts the "Technical contact" defined in §6.1 to resolve the malfunction. The "Technical contact" must have access to the IP VPN line equipment of the User's site or be able to provide access to such equipment to the Operator's staff. Any delays due to a lack of response from the "IP VPN Local Contact Person" during this contact will not be taken into account in the calculation of the system availability indicators (see §3.3.1).
    - RTE will be informed by the Operator of the resolution of the malfunction.
- Scheduled Intervention
    - In case of a planned operation on the User's VPN IP line, an alert email will be sent to the "Technical Contact" defined in §6.1, with a minimum of 24 hours of notice.

## 7. Definitions and glossary of abbreviations

### 7.1. Definitions

All words or groups of words used in this document with their first capital letters have the meaning given to them below or in Article 1 of the balancing market terms and conditions [3].

### 7.2. Glossary of Abbreviations

User	Customer of the telecommunication service provided by RTE.
ACL	Access Control List.
CE	Customer Edge (IP VPN access router of a telecom operator on User Site).
CRC	RTE Customer Relationship Manager
DIG	Galvanic insulation device that isolates telecommunications access from the operator network site to at least 6 kV.
DNS	Domain Name Server
VRRP	Virtual Router Redundancy Protocol.
IP	Internet Protocol.
IP VPN	IP Virtual Private Network.
LAN	Local Area Network.
Operator	Telecom Operator designated by RTE (also labelled "Third Party" in the TAO Implementation Guide).
QoS	Quality of Service.
SDSL	Symmetric digital subscriber line.
VPN	Virtual Private Network (Network made available by the Operator to interconnect multiple organisations).
VRF	VPN Routing/Forwarding: routing table associated with a VPN.
WAN	Wide Area Network.

**END OF DOCUMENT**

## APPENDIX 1: INFORMATION ON THE PARTNER POWER SYSTEM CONTROL CENTRE FOR THE TELECOM CONNECTION

REQUEST FOR INFORMATION	RESPONSE
<b>The exact address of the site to be connected<sup>3</sup></b> <ul style="list-style-type: none"> <li>- Number, street name</li> <li>- Postal Code</li> <li>- City</li> <li>- GPS coordinates of the site</li> <li>- Specific Authorisation to access the site (e.g.: SEVESO)</li> <li>- Need for a Prevention Plan</li> </ul>	
<b>Local contact of service provider no. 1</b> <ul style="list-style-type: none"> <li>- Surname, First Name</li> <li>- Email Address</li> <li>- Land line number</li> </ul>	
<b>Local contact of service provider n°2</b> <ul style="list-style-type: none"> <li>- Surname, First Name</li> <li>- Email Address</li> <li>- Land line number</li> </ul>	
<b>Nature of the telecom service of the site to be connected:</b> <ul style="list-style-type: none"> <li>- Single or double (1 or 2 quad cables)</li> <li>- Possible cable saturation<sup>4</sup></li> <li>- Other information considered interesting on the entry(ies) to be used</li> <li>- Identification of substation entry</li> <li>- Constraint on substation entry</li> </ul>	
<b>Site situation plan, with dimensions</b> <ul style="list-style-type: none"> <li>- Locate the inlet for the telecom operator</li> <li>- Locate distribution box</li> <li>- Locate the space where the telecom equipment will be put (array, router, TCM enclosure, etc.)</li> </ul>	
<b>Customer RTC No.<sup>5</sup></b>	

<sup>3</sup> This is the site where the application in charge of exchanges with the TAO system is located. This may be the site of an external host and not the site participating in the market system.

<sup>4</sup> Existence of an available copper pair, or else the possibility of freeing one?

<sup>5</sup> Telephone number arriving on the site distribution box to be connected