

BME PROXIMITY SERVICE

1. Introduction

The scope of this document is to describe the BME Proximity service to access SIBE and MEFF markets. Since co-location at the BME Data Center is not allowed, the proximity is offered from the VT Proximity Site, the closest Data Center to the BME Data Center. The key points of the solution are:

- The latency from the VT proximity site to the Exchange Host is 83 microseconds.
- The VT proximity site is connected to the BME Data Center by 2 x 1 GB optical fiber lines without hardware elements in the line and with different providers.
- Market Data is available at the VT proximity site at 83 microseconds latency.
- BME Proximity services are managed by Visual Trader Systems, a company integrated in BME Group.

2. VT Proximity infrastructure

Proximity services are offered from two different Housing locations, Main Site (Site A) and Back-Up Site (Site B). Please see the figure in the next page.

The location of the Back-Up site has been chosen also to cover both sites in which the market host could be operative, as main and as backup center.

As per the different tests performed, the following circumstances have been taken into account so as to choose these Sites:

- **Physical distance between the Housing sites and the BME Datacenter.**

Each of the two sites is located in the nearest location to one or the other BME data center site, taking into account the fiber path distance.

- **Fiber path distance between the Housing location and the market trading platform:**

- Physical distance is relevant as far as the network configuration follows a similar path. Although nearer options seemed better at first glance, subsequent analyses showed significant delays.
- Consequently, relevance has been given to the network topology so as to reduce the fiber distance between the Housing sites and the market.

- **Serialization delay associated with the size of the packet data and the physical circuit speed.**

Tests have been made with estimation of packet size of 256 bytes and circuits of 100 Mbps.

- **Switching delay of hardware components**

Network configuration is set up so as to minimize increases in latency as a result of network components such as hubs, routers, etc.

Housing and Connection to BME Data Center (SIBE and MEFF hosts)

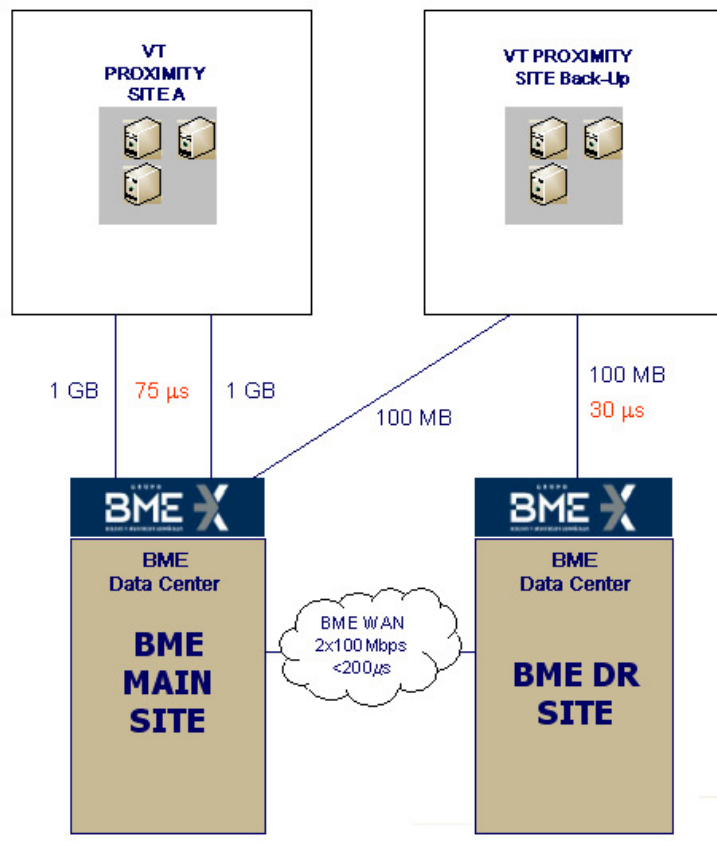
The Black-Boxes can be installed in the **Site A** and/or in the **Site B** (see figure). In relation to latencies, and as per the tests performed:

- Proximity Housing Site A in its connection to BME Main Site achieves a latency **below 75 microseconds** (not including end-routers) The connection is made by one line of 1 GB for the main access (bandwidth from 10MB to 100MB is available per client). The back-up line is also 1 GB with different provider.
- Proximity Housing site B in its connection for access to back up platform/secondary main platform achieves a latency of **around 30 microseconds** (Note: this latency is from Site B to the BME Disaster Recovery Site, not including end-switches). The connection is made by one line of 100 MB, (from 2MB to 10MB available per client).
- Finally, another 100 MB line (from 2 MB to 10 MB available per client) connects Site B to the SIBE main site.
- BME Main and DR Site are connected through an internal network WAN, 2 x 100MB, latency <200 microseconds.

- The proximity connections are made using CISCO 4948 routers, guaranteeing less than 4 microseconds latency in processing the signal.

The above telecommunications infrastructure allows different combinations depending on the different contingency situations may happen.

Therefore, the VT proximity solution achieves less than 83 microseconds latency including lines and end-routers in from the Main Proximity Site (Site A) to the Main SIBE Site (75 mcs of the line + 4 mcs + 4 mcs of each router), and around 234 microseconds in total from the Back-up site (Site B) to the Main BME Site.



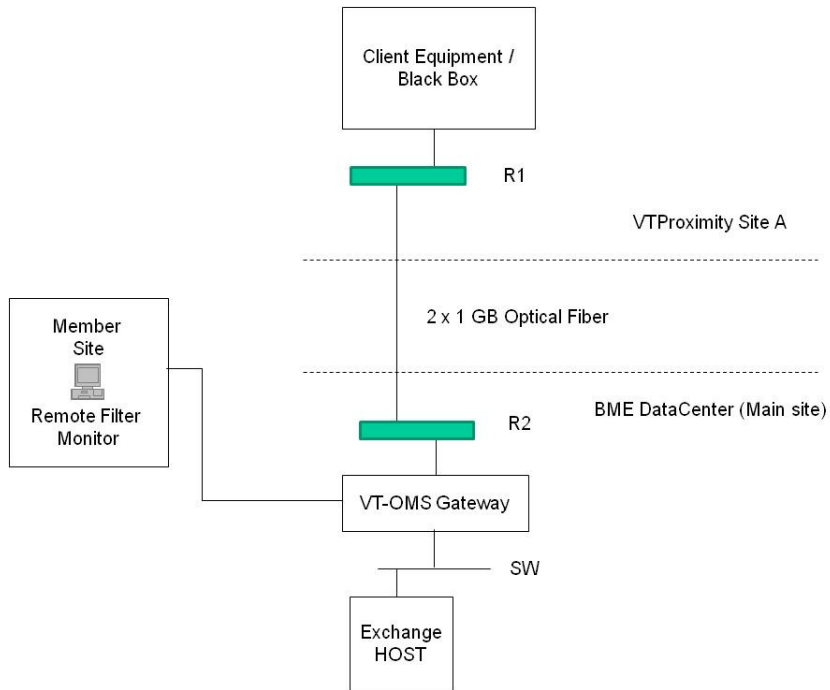
(Note: SIBE and MEFF Hosts are located at the BME Data Center)

Remote access to the proximity centers. The following telecommunications operators are available:

- Site A: COLT, TELEFONICA, BT, NEOSKY, RADIANTZ, ATRIUM
- Site B: COLT, TELEFONICA

3. Architecture

The proximity architecture for the installation of the black-box is the following:



4. Latency

The total latency is:

- Router R1: 4 microseconds
- Fiber path distance: 75 microseconds
- Router R2: 4 microseconds
- VT OMS Gateway: less than 1 millisecond*

This is the time spent in converting the FIX protocol to the SIBE proprietary protocol plus passing the filters and reading/writing from/to the network. Depending on the filters required, the latency at this point may be increased (<1 millisecond latency corresponds to the minimum filters allowed).

**this time doesn't include the latency of the market in processing the order.*

The Remote Filter Monitor allows the Member a pre-trading control of all the order flow received from the Client application (Black-Boxes or other). By the Member decision, the filters can be fully opened.