



# LMEsource v4 On-boarding Tools

## User Guide

# Document History

Version	Date	Changes
1.0	03/08/2023	Released



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# 1 Introduction

This document describes the use of the On-boarding Tools for LMEsource, the LME's multicast market data platform.

The LMEsource On-boarding Tools provide simulated market data (canned data) for users of LMEsource. These tools facilitate the development, enhancement and testing of the user systems which receive and process data from LMEsource.

LMEsource On-boarding Tools support clients' capacity and performance tests by allowing canned data to be replayed at various fixed rates. Users can also make use of the LMEsource On-boarding Tools for testing their own systems' development and enhancements. By distributing different sets of canned data to the users, LME aims to support users in the testing of their systems' readiness for various implementations of LMEsource initiatives.

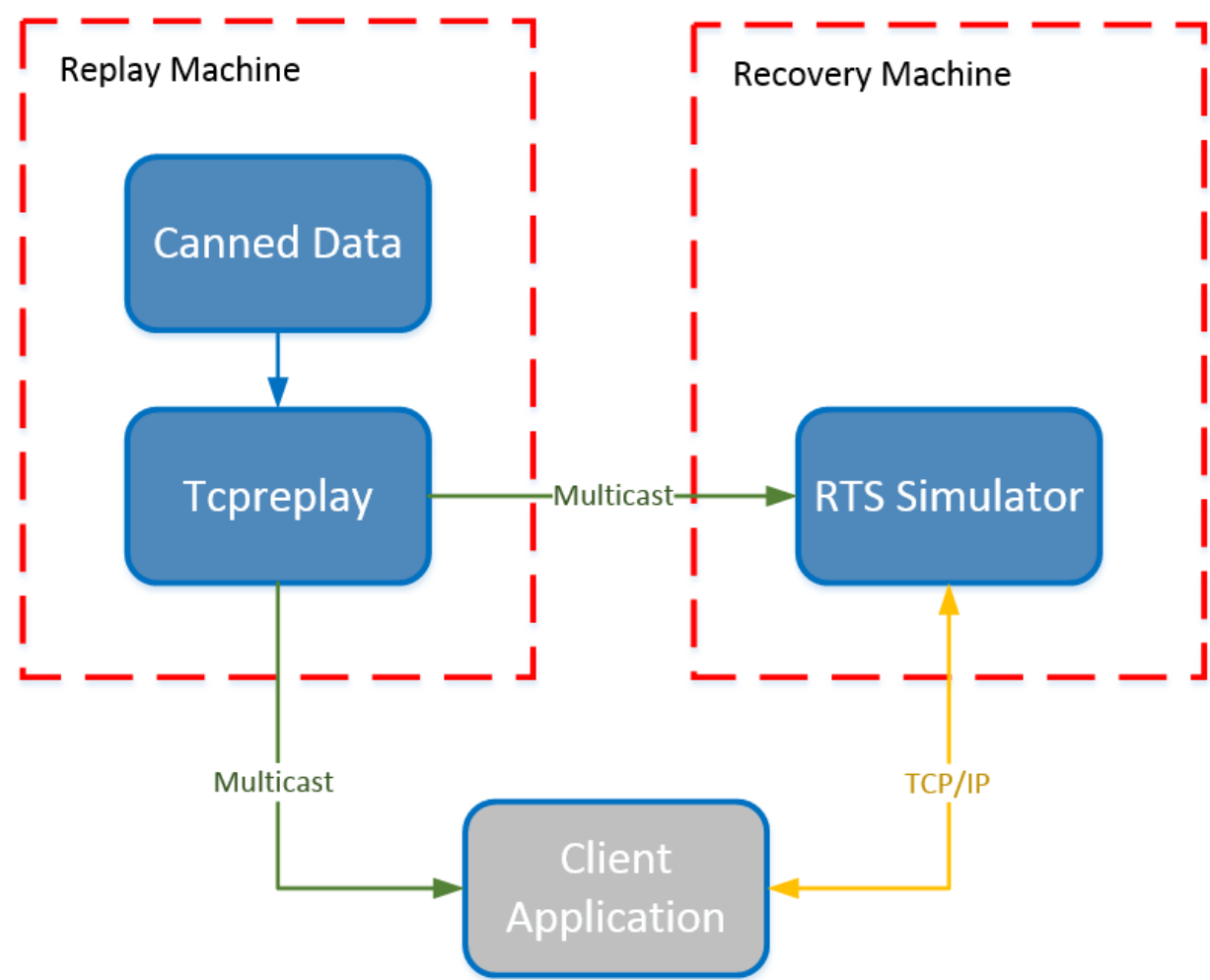
## 1.1 LMEsource On-Boarding Tools Components

Component	Description
RTS Simulator	Facilitates testing of users' software against LMEsource retransmission services including retransmission requests, retransmission responses, logons, logon responses and the processing of the missed messages requested as sent via unicast connection.
tcpreplay	Broadcasts LMEsource canned data via multicast over the network. The following functions are available: <ul style="list-style-type: none"><li>- Rate control in packets per second</li><li>- Broadcasts on both A&amp;B lines</li></ul>
Canned Data	Fictitious trading data to facilitate testing. <ul style="list-style-type: none"><li>- Separate files may exist for different testing purpose (e.g. volume test or functional test)</li><li>- The canned data will be injected by the tcpreplay to simulate the LMEsource production/testing environment.</li></ul>

## 1.2 System Relationship Diagram

The relationship diagram between the LMEsource and users' application systems and the system's components is shown below. It is also possible to run the client application on the same system as the RTS simulator if desired.





1.3 Glossary

Acronym	Description
RTS	ReTransmission Server



## 2 System Requirement and Installation

### 2.1 Hardware Requirements

2 connected machines (Replay Machine and Recovery Machine) each with the following specification:

- 64-bit AMD or Intel processor
- 4 GB RAM
- 20 GB available disk space

### 2.2 Software Requirements

- Red Hat Enterprise Linux (RHEL) 8 64-bit Edition
- root / sudo access
- Tcpdump (Replay Machine only)
- Tcpreplay (Replay Machine only)

### 2.3 Installation Procedures

#### 2.3.1 Replay Machine

Step	Description
1	<p>Copy the 'cannedDataLocalizingTool.tar.gz' directory from the provided media to the desired host. Here is an example command:</p> <pre>cp -r /*Path to CDROM*/cannedDataLocalizingTool.tar.gz /home/userid</pre>
2	<p>Extract the TAR/GZIP file to the correct directory:</p> <pre>tar xvzf cannedDataLocalizingTool.tar.gz</pre>
3	<p>To verify the installation was successful, the following command will show the contents of the install directory:</p> <pre>ls /home/userid/cannedDataLocalizingTool</pre> <p>If successful, the directory will contain:</p> <pre>common.sh pcapPreparationTool.sh preparePlaybackCacheFile.sh rewriteChecksum.sh updateIpMacAddress.sh</pre>
4	<p>Install tcpreplay:</p> <p>Please refer to the installation instruction provided by tcpreplay.</p>



### 2.3.2 Recovery Machine

Step	Description
1	Copy the 'onboardingTools_4.0.tar.gz' directory from the provided media to the desired host. Here is an example command:  <pre>cp -r /*Path to CDROM*/onboardingTools_4.0.tar.gz /home/userid</pre>
2	Extract the TAR/GZIP file to the correct directory:  <pre>tar xvzf onboardingTools_2.0.tar.gz -C /app</pre> Note* - the tools will not work if they are not in the correct directory structure.
3	Add the correct directory permissions:  <pre>chown -R {userid:usergroup} /app/omdem</pre> Where userid & usergroup is the system account used to run the onboarding tools.
4	To verify the installation was successful, the following command will show the contents of the install directory:  <pre>ls /app/omdem/</pre> If successful, the directory will contain:  <pre>bin cfg env lib log</pre>

## 2.4 Configuration

The On-boarding Tools package is designed to playback data from the Replay machine and to run recovery services (RTS Simulator) on the Recovery machine. The client application can be run on the Recovery machine connected to the recovery service via the loopback interface or can be run on a separate machine connected to the recovery service via a TCP connection.

Since the network connection between the Replay machine and the Recovery machine is different in each setup, it is required to modify the recovery service configuration so as to fit the interface available on the Replay machine. This section will detail how to do that.

The configuration for the RTS Simulator is stored in the 'cfg/xdp-rt-s-client-sim.xml' file. At the top of this file, you will notice a configuration section created for this purpose.

Step	Description
1.	Edit the RTS Simulator's configuration.



Step	Description
	<p>Open the file:</p> <pre>cfg/xdp-rt-s-client-sim.xml</pre> <p>At the top there is a multi-host section as detailed in section 2.4.1.</p> <p>Below is a description of the relevant parameters.</p> <p><b>Point B</b> - This defines the network interface where the RTS Simulator listens for market data from the tcpreplay. This should nearly always be set to the interface connected to Point A, which is detailed in the next step.</p> <p><i>DefaultMulticastInterface1</i> - The primary (A line) interface that the RTS Simulator listens to for multicast data from the tcpreplay.</p> <p><i>DefaultMulticastInterface2</i> - The secondary (B line) interface that the RTS Simulator listens to for multicast data from the tcpreplay. This can be the same as the primary interface for this test.</p> <p><b>Point C</b> - This is where the RTS Simulator interface to the client is defined. The IP address here can be any valid network interface on the host.</p> <p><i>RtsTcpIpAddress</i> - The TCP/IP address that the RTS Simulator will listen for client connections on.</p> <p><i>RtsTcpPort</i> - The TCP/IP port the RTS Simulator will listen for client connections on.</p> <ul style="list-style-type: none"> <li>• For customers running client application on Recovery Machine please refer to section 2.4.2.</li> <li>• For customers running client application on a separate machine please refer to section 2.4.3.</li> </ul> <p>Once the values have been set accordingly save the configuration file.</p> <p><b>Point D</b> - This is where the RTS Simulator list of clients is defined, the IP address here is per client and has to be the IP address that the corresponding user is going to login from.</p> <p><i>IpAddress</i> - The RTS client's IP address.</p>
2.	<p><b>Point A</b> - is the network interface that is the source of market data for both the client and the RTS Simulator.</p>
3.	<p><b>Between Point D and Multiple Machine Config Change</b> - This is the data channel multicast group configuration.</p> <p>A set of canned data might be produced that uses a different multicast group to deliver the data. Although a different multicast group and port might be used, the logical data channel name is still the same.</p> <p>There is a set of <i>Feed</i> parameters in the configuration specified for each logical data channel. The <i>Listen</i> parameter within the configuration might need to be updated according to the readme file associated with the canned data.</p>





Step	Description
4.	Once the script has been started subscribe to one of the channels with a test application to verify the changes are working.

### 2.4.1 Example 1 - Default Configuration of 'xdp-rts-client-sim.xml'

```

<!-- Multiple Machine Config Change -->

<!-- Point C -->

<Parameter>
<Name>RtsTcpIpAddress</Name>
<Value>127.0.0.1</Value>
</Parameter>
<Parameter>
<Name>RtsTcpPort</Name>
<Value>6969</Value>
</Parameter>

<!-- Point B -->

<Parameter>
<Name>DefaultMulticastInterface1</Name>
<Value>127.0.0.1</Value>
</Parameter>

<Parameter>
<Name>DefaultMulticastInterface2</Name>
<Value>127.0.0.1</Value>
</Parameter>

<!-- Point D -->

<ClientList>
<Client>
<UserName>test01</UserName>
<IpAddresses>127.0.0.1</IpAddresses>
<MaximumGap>100</MaximumGap>
<MaximumRequests>1000</MaximumRequests>
<MaximumMessages>10000</MaximumMessages>
<Parameter>
<Name>Channels</Name>
<Value>111</Value>
<Value>112</Value>
<Value>113</Value>
<Value>115</Value>
<Value>116</Value>
<Value>131</Value>
<Value>132</Value>
<Value>133</Value>
<Value>135</Value>
<Value>136</Value>
<Value>200</Value>

```



```

<Value>205</Value>
<Value>206</Value>
<Value>207</Value>
<Value>208</Value>
<Value>209</Value>
<Value>215</Value>
<Value>216</Value>
<Value>217</Value>
<Value>218</Value>
<Value>307</Value></Parameter>
</Client>
</ClientList>

<!-- /Multiple Machine Config Change -->

```

## 2.4.2 Example 2 - Configuration for Client Application on the Recovery Machine

```

<!-- Multiple Machine Config Change -->

<!-- Point C -->

<Parameter>
<Name>RtsTcpIpAddress</Name>
<Value>127.0.0.1</Value>
</Parameter>

<Parameter>
<Name>RtsTcpPort</Name>
<Value>6969</Value>
</Parameter>

<!-- Point B -->

<Parameter>
<Name>DefaultMulticastInterface1</Name>
<Value>10.0.2.15</Value>
</Parameter>
<Parameter>
<Name>DefaultMulticastInterface2</Name>
<Value>10.0.2.15</Value>
</Parameter>

<!-- Point D -->

<ClientList>
<Client>
<UserName>test01</UserName>
<IpAddresses>127.0.0.1</IpAddresses>
<MaximumGap>100</MaximumGap>
<MaximumRequests>1000</MaximumRequests>
<MaximumMessages>10000</MaximumMessages>
<Parameter>
<Name>Channels</Name>
<Value>111</Value>
<Value>112</Value>
<Value>113</Value>

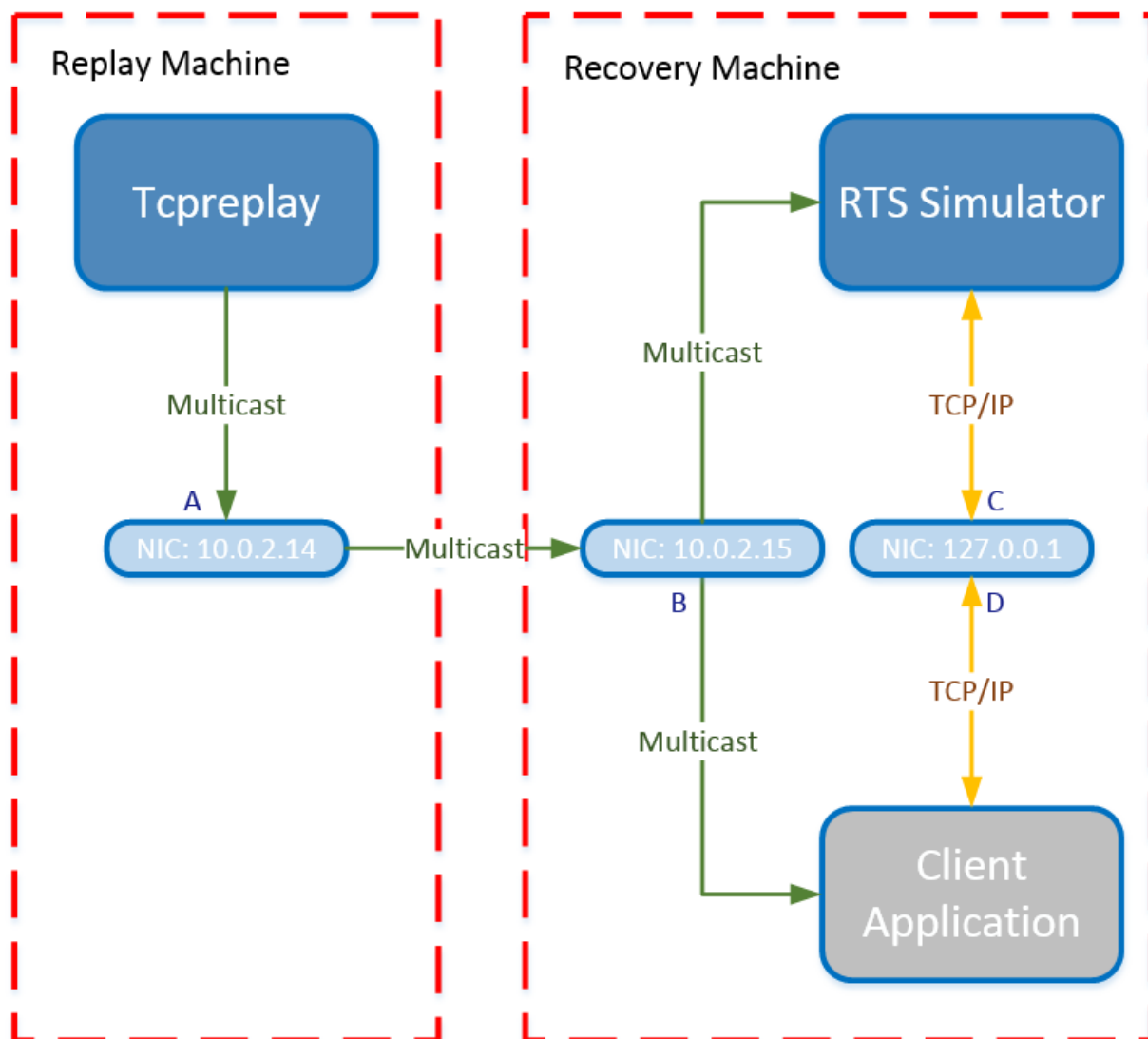
```



```
<Value>115</Value>
<Value>116</Value>
<Value>131</Value>
<Value>132</Value>
<Value>133</Value>
<Value>135</Value>
<Value>136</Value>
<Value>200</Value>
<Value>205</Value>
<Value>206</Value>
<Value>207</Value>
<Value>208</Value>
<Value>209</Value>
<Value>215</Value>
<Value>216</Value>
<Value>217</Value>
<Value>218</Value>
<Value>307</Value></Parameter>
</Client>
</ClientList>

<!-- /Multiple Machine Config Change -->
```





### 2.4.3 Example 3 - Configuration for Client Application NOT on the Recovery Machine

```
<!-- Multiple Machine Config Change -->

<!-- Point C -->

<Parameter>
<Name>RtsTcpIpAddress</Name>
<Value>10.0.3.15</Value>
</Parameter>

<Parameter>
<Name>RtsTcpPort</Name>
<Value>6969</Value>
</Parameter>

<!-- Point B -->
```



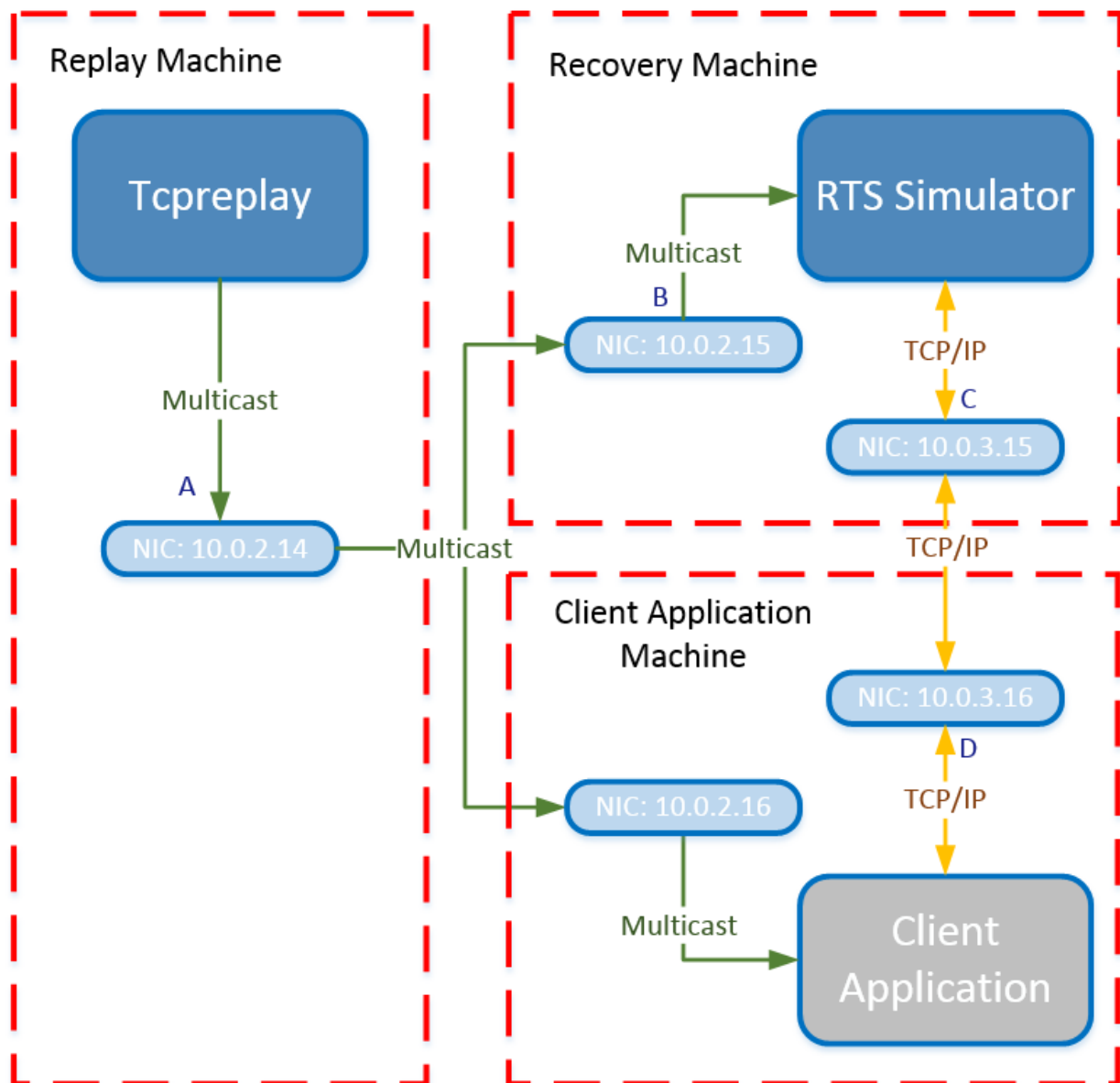
```
<Parameter>
<Name>DefaultMulticastInterface1</Name>
<Value>10.0.2.15</Value>
</Parameter>
<Parameter>
<Name>DefaultMulticastInterface2</Name>
<Value>10.0.2.15</Value>
</Parameter>

<!-- Point D -->

<ClientList>
<Client>
<UserName>test01</UserName>
<IpAddresses>10.0.3.16</IpAddresses>
<MaximumGap>100</MaximumGap>
<MaximumRequests>1000</MaximumRequests>
<MaximumMessages>10000</MaximumMessages>
<Parameter>
<Name>Channels</Name>
<Value>111</Value>
<Value>112</Value>
<Value>113</Value>
<Value>115</Value>
<Value>116</Value>
<Value>131</Value>
<Value>132</Value>
<Value>133</Value>
<Value>135</Value>
<Value>136</Value>
<Value>200</Value>
<Value>205</Value>
<Value>206</Value>
<Value>207</Value>
<Value>208</Value>
<Value>209</Value>
<Value>215</Value>
<Value>216</Value>
<Value>217</Value>
<Value>218</Value>
<Value>307</Value></Parameter>
</Client>
</ClientList>

<!-- /Multiple Machine Config Change -->
```





## 3 Operational Procedures

### 3.1 Starting the LMEsource On-boarding Tools

#### 3.1.1 Start the LMEsource Environment on the Recovery Machine

Step	Description
1.	Start in the LMEsource path: <code>cd /app/omdem</code>
2.	Source the profile, this will set various environment variables which are based on the install path: <code>source env/env.cfg</code>  Change directory to the 'bin' directory: <code>cd bin</code>
3.	Run the start script to start ReTransmission Server: <code>start_simulation.sh</code>  The script will output the following to the screen if successful: <code>Starting ReTransmission Server</code> <code>Logging to /app/omdem/log</code>
4.	To verify that the processes are running, check that their log files are updating via: <code>ls /app/omdem/log</code>  Once these processes are running, it is possible to receive LMEsource data from the Replay Machine and utilise the retransmission server, which will be populated by the data being sent by the tcpreplay.  At the end of the replay file, the tcpreplay will cease broadcasting data and the playback.sh script should be executed once more.

#### 3.1.2 Playback Canned Data on Replay Machine

Step	Description
1.	Start in the Canned Data Localizing Tool path: <code>cd /home/userid/cannedDataLocalizingTool</code>



Step	Description
2.	<p>Check the interface specified in the Canned Data Localizing Script does match that specified in the readme file that comes with the can data. Update the value to follow the canned data readme if different.</p> <p>Check /common.sh</p> <pre>PCAP_SRC_IP_A=10.138.39.0/24 PCAP_SRC_IP_B=10.138.139.0/24</pre>
3.	<p>Execute the Canned Data Localizing Script: .</p> <pre>/pcapPreparationTool.sh &lt;Canned Data File Name&gt;</pre> <p>During the execution, the script will ask runner to select the interface to be used for the data playback. After selection, a script "playback.sh" will be generated.</p> <p>The script will output the following to the screen if successful:</p> <pre>===== NIC #      NIC      IP      MAC Address ===== 1          eth0      10.1.65.50    e8:39:35:eb:97:98 2          eth1      10.1.88.50    e8:39:35:eb:97:9a 3          eth2      10.0.8.50     e8:39:35:eb:97:9c 4          eth3      10.1.89.50    e8:39:35:eb:97:9e 5          eth4      10.1.66.50    f4:ce:46:a9:eb:8c 6          eth5      10.70.12.50   f4:ce:46:a9:eb:8d 7          eth6      10.1.90.50    f4:ce:46:a9:eb:8e 8          eth7      10.0.9.50     f4:ce:46:a9:eb:8f ===== Input Source NIC # above for playback Line A and Line B data : 1  Selected NIC (Line A) # eth0 10.1.65.50 e8:39:35:eb:97:98 (1) Selected NIC (Line B) # eth0 10.1.65.50 e8:39:35:eb:97:98 (1)  ##### ##### # Start preparing the pcap files ##### #####  1. Update the source IP and MAC address tcprewrite --pnat=10.1.65.0/24:10.1.65.50 --enet-smac=e8:39:35:eb:97:98 --infile=pcap/omdc-20230613.pcap --outfile=pcap/omdc-20230613.pcap.tmp tcprewrite --pnat=10.1.66.0/24:10.1.66.50 --enet-smac=f4:ce:46:a9:eb:8c --infile=pcap/omdc-20130913.pcap.tmp --outfile=pcap/omdc- 20130913.pcap_PLAYBACK  2. Recalculate IPv4/TCP/UDP header checksums tcprewrite -C -i pcap/omdc-20230613.pcap_PLAYBACK -o pcap/omdc- 20230613.pcap_PLAYBACK.rewrite  3. Prepare cache file for tcpreplay to playback Line A / B</pre>





Step	Description
	<pre>tcpprep -e e8:39:35:eb:97:98 -i pcap/omdc-20230613.pcap_PLAYBACK.rewrite -o pcap/omdc-20230613.pcap_PLAYBACK.rewrite.tag  ##### ##### Update pcap file completed SUCCESSFULLY.  You can now playback the file with ./playback.sh  =&gt; ./playback.sh (sudo tcpreplay -i eth0 -I eth4 -x 10 -c pcap/omdc- 20230613.pcap_PLAYBACK.rewrite.tag pcap/omdc- 20230613.pcap_PLAYBACK.rewrite)  *Note* - the Canned Data File can be found in the root path of the provided media, with extension "pcap".</pre>
4.	<p>Playback data using the generated playback script.</p> <pre>./playback.sh</pre>

## 3.2 Retransmission Server

The retransmission server simulator is started using the 'start\_simulation.sh' script. The server is communicated with via TCP/IP.

The retransmission server operates using IP: 127.0.0.1, Port: 6969 and UserName: test01.

Multiple logons to the RTS Simulator using the same socket are not supported by the On-boarding Tools.

Users should avoid using two applications (or two instances of the same application) to log-in to the RTS Simulator using the same UserName. This will result in all further login attempts on that UserName being refused.

## 3.3 Log Files

Log files only serve to indicate that the process is up (it is still writing to the log file) and how much data it is receiving.

Log files can be found in the 'log' directory.

The Retransmission Server produces two log files: 'RTS\_init\_<YYYYMMDD>.log', 'RTS\_<YYYYMMDD>.log' and 'xdp-rts\_fw\_YYYYMMDD.log'. The application initialization information is kept in 'RTS\_init\_<YYYYMMDD>.log' and the most recent runtime information is kept in the 'RTS\_<YYYYMMDD>.log'.

### 3.3.1 Example 1 – Retransmission Server Log File

```
2023/06/29 12:48:15.975936,I, 00007F489594BB00: StartByAgent: false
2023/06/29 12:48:15.976033,I, 00007F489594BB00: OTP FwInitArg0 : xdp-rts
2023/06/29 12:48:15.976051,I, 00007F489594BB00: OTP FwInitArg1 : xdp-rts
```



```
2023/06/29 12:48:15.976063,I, 00007F489594BB00: OTP FwInitArg2 : 0
2023/06/29 12:48:15.976074,I, 00007F489594BB00: OTP FwInitArg3 : 0
2023/06/29 12:48:15.976085,I, 00007F489594BB00: OTP FwInitArg4 : 0
2023/06/29 12:48:15.976096,I, 00007F489594BB00: OTP FwInitArg5 :
/app/omdem/cfg/fw_config_rts.txt
2023/06/29 12:48:15.976107,I, 00007F489594BB00: OTP FwInitArg6 : /app/omdem/log
2023/06/29 12:48:15.980284,I, 00007F489594BB00: xdp-rts: Version ["4.28.0"] Build
Date ["14062023"] Git revision ["e63f105"]
2023/06/29 12:48:15.980307,I, 00007F489594BB00: Hostname: localhost
```

### 3.3.2 Example 2 – Retransmission Server Log File

```
2023/06/29 02:05:22.785041,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc115 [239.150.37.65:50100] packets:1373 rate:2 max:1373 max rate:2
total:1373
2023/06/29 02:05:22.785047,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc115 [239.150.38.65:50100] packets:1373 rate:2 max:1373 max rate:2
total:1373
2023/06/29 02:05:22.785048,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc112 [239.150.37.69:50105] packets:1268 rate:2 max:1268 max rate:2
total:1268
2023/06/29 02:05:22.785049,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc112 [239.150.38.69:50105] packets:1268 rate:2 max:1268 max rate:2
total:1268
2023/06/29 02:05:22.785050,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc111 [239.150.37.68:50104] packets:1268 rate:2 max:1268 max rate:2
total:1268
2023/06/29 02:05:22.785050,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc111 [239.150.38.68:50104] packets:1268 rate:2 max:1268 max rate:2
total:1268
2023/06/29 02:05:22.785051,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc116 [239.150.37.76:50110] packets:1246 rate:2 max:1246 max rate:2
total:1246
2023/06/29 02:05:22.785052,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc116 [239.150.38.76:50110] packets:1246 rate:2 max:1246 max rate:2
total:1246
2023/06/29 02:05:22.785053,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc135 [239.150.37.59:50250] packets:1237 rate:2 max:1237 max rate:2
total:1237
2023/06/29 02:05:22.785053,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc135 [239.150.38.59:50250] packets:1237 rate:2 max:1237 max rate:2
total:1237
2023/06/29 02:05:22.785055,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc132 [239.150.37.61:50255] packets:1202 rate:2 max:1202 max rate:2
total:1202
2023/06/29 02:05:22.785055,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc132 [239.150.38.61:50255] packets:1202 rate:2 max:1202 max rate:2
total:1202
2023/06/29 02:05:22.785056,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc131 [239.150.37.60:50254] packets:1202 rate:2 max:1202 max rate:2
total:1202
2023/06/29 02:05:22.785057,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc131 [239.150.38.60:50254] packets:1202 rate:2 max:1202 max rate:2
total:1202
2023/06/29 02:05:22.785058,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc136 [239.150.37.63:50260] packets:1494 rate:2 max:1494 max rate:2
total:1494
```



```
2023/06/29 02:05:22.785058,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc136 [239.150.37.63:50260] packets:1494 rate:2 max:1494 max rate:2
total:1494
2023/06/29 02:05:22.785059,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc113 [239.150.37.70:50106] packets:1311 rate:2 max:1311 max rate:2
total:1311
2023/06/29 02:05:22.785059,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc113 [239.150.38.70:50106] packets:1311 rate:2 max:1311 max rate:2
total:1311
2023/06/29 02:05:22.785098,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc133 [239.150.37.62:50256] packets:1206 rate:2 max:1206 max rate:2
total:1206
2023/06/29 02:05:22.785099,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc133 [239.150.38.62:50256] packets:1206 rate:2 max:1206 max rate:2
total:12062023/06/29 02:15:22.783607,I, 00007FD737FFF700:
[LineMonitor::print] Channel:mc200 [239.150.37.180:50200] packets:1476 rate:2
max:1476 max rate:2 total:1476
2023/06/29 02:15:22.783608,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc200 [239.150.38.180:50200] packets:1476 rate:2 max:1476 max rate:2
total:1476
2023/06/29 02:15:22.783609,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc205 [239.150.37.185:50205] packets:1476 rate:2 max:1476 max rate:2
total:1476
2023/06/29 02:15:22.783610,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc205 [239.150.38.185:50205] packets:1476 rate:2 max:1476 max rate:2
total:1476
2023/06/29 02:15:22.783612,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc206 [239.150.37.186:50206] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783613,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc206 [239.150.38.186:50206] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783614,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc207 [239.150.37.187:50207] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783614,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc207 [239.150.38.187:50207] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783615,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc208 [239.150.37.188:50208] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783696,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc208 [239.150.38.188:50208] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783702,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc209 [239.150.37.189:50209] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783703,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc209 [239.150.38.189:50209] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783704,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc215 [239.150.37.195:50215] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783705,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc215 [239.150.38.195:50215] packets:1474 rate:2 max:1474 max rate:2
total:1474
```



```

2023/06/29 02:15:22.783705,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc216 [239.150.37.196:50216] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783706,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc216 [239.150.38.196:50216] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783707,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc217 [239.150.37.197:50217] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783707,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc217 [239.150.38.197:50217] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783708,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc218 [239.150.37.198:50218] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783709,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc218 [239.150.38.198:50218] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783710,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc307 [239.150.37.207:50307] packets:1474 rate:2 max:1474 max rate:2
total:1474
2023/06/29 02:15:22.783711,I, 00007FD737FFF700: [LineMonitor::print]
Channel:mc307 [239.150.38.207:50307] packets:1474 rate:2 max:1474 max rate:2
total:1474

```

We have highlighted two key log messages here to search for in the files as the initialisation is particularly long.

Example 1 indicates the successful starting of the process, which host it is running on, and that it has found its configuration file.

Example 2 shows that the Retransmission server is receiving data on all of the 36 channels.

**Remark:** The Retransmission Server Log primarily facilitates LME checking when there are queries related to the LMEsource retransmission service in the On-boarding tools raised by the users. The two examples quoted here are sufficient for the users to health check the normal running of the Retransmission Server, and are not required to check other messages as logged in the Log file.

### 3.4 Changing Market Data

It may be desirable to switch between various sets of market data released by the LME.

This can be achieved by re-running the Canned Data Localization Script with the new data as described in section 3.1.2, and then replaying data using the newly generated playback.sh.

### 3.5 Shutdown of LMEsource

A script has been provided to shut down all LMEsource tools.

Step	Description
1.	Run the following: <code>stop_simulation.sh</code>



### 3.6 Performance Testing

Tcpreplay can control the message rate at which the canned data file is replayed. Therefore, the LMEsource On-boarding Tools are also capable of being used to test system performance, namely throughput. Users can modify the `playback.sh` generated by the Canned Data Localising script to add argument for specifying the packet rate (`--pps`), replay multiplier (`--multiplier`) or the playback bandwidth (`--mbps`) in the play back.

Please refer to tcpreplay documentation regarding control of the packet replay rate.

The expected bandwidth requirements for each market data package is available from the LME website. It is expected that before the Readiness Test that clients have stressed their systems to the equivalent message bandwidth of the market data package that they have chosen.

The packet rates recommended for different LMEsource Datafeed Products for testing the client system in handling the stated message volume are for reference only. It may not drive the expected message volume but will be as close as possible. The recommended packet rates only apply to the canned data we provided and may be different for different sets of canned data.



## 4 Appendix A – FAQ and Troubleshooting

### 4.1 Reporting Issues

In the event that the software is not working as expected please verify the following:

- Check /etc/redhat-release to ensure the Red Hat version is 8.
- Run 'free -m' and ensure there is at least 3GB free memory, and 4GB total system RAM
- Run the package in its default configuration and verify the data flow as described in Section 3.

If the software still fails to work as expected, LME Market Data Vendors should contact the LME Market Data team at [LMEmarketdataops@lme.com](mailto:LMEmarketdataops@lme.com). Members and all other participants should contact LME Trading Operations at [tradingoperations@lme.com](mailto:tradingoperations@lme.com).

### 4.2 FAQ

#### 1. Why does our xdp-rts process die immediately after start-up?

This is usually caused by not enough free memory; occasionally the OS will report this in the 'dmesg' log, but not always. The xdp-rts process allocates a large amount of its memory on initialization.

#### 2. We encountered 'undefined symbol', 'symbol lookup error' and 'library not found' messages. How can we proceed?

These errors are produced when the package is installed on the wrong version of Red Hat OS.

#### 3. Why is our login rejected?

This can be due to the following reasons:

- the packet header is not sent as required at the start of the login string or
- the packet size is sent big endian instead of little endian as per the Interface Specification or
- the packet is space terminated instead of NULL terminated.

Example of a valid login hex string:

**20 00 01 30 01 00 00 00 00 00 00 00 00 00 00 00** 10 00 65 00 74 65 73 74 30 31 00 00 00 00 00 00

The packet header is highlighted.

#### 4.2.1 Questions Related to Network Setup

##### 4.2.1.1 Client Application on Recovery Machine

#### 4. Why can our system receive data but the RTS Simulator is responding with 'MESSAGES\_NOT\_AVAILABLE'?

Check that the RTS Simulator is not configured to listen to the loopback address

Please verify that both the "Point A" and "Point B" are set to the same value in the xdp-rts-client-sim.xml file.

#### 5. Why is our system unable to connect to the RTS Simulator or the login is rejected?



The "Point C" or "Point D" IP address has been configured incorrectly in the xdp-rts-client-sim.xml file

Please verify that the "Point C" IP address has been configured correctly in the xdp-rts-client-sim.xml file and is not currently set to the loopback address. Also, please verify that the "Point D" IP address has been configured correctly in the xdp-rts-client-sim.xml file and is not currently set to the loopback address. This address should be set to the source address of the connection to the retransmission server.

**6. Why does the RTS Simulator reject the login from our system?**

Please refer to Question 5 above for details.

**4.2.1.2 Client Application not on Recovery Machine**

**7. Why can our system receive data but the RTS Simulator is responding with 'MESSAGES\_NOT\_AVAILABLE'?**

This is possibly due to the following reasons:

- The RTS Simulator is configured to listen to the loopback address. Verify that both the "Point A" and "Point B" addresses are set to the same value in the xdp-rts-client-sim.xml file. In this setup the value for "Point C" is likely to be different from "Point A" & "Point B". The RTS Simulator needs to listen to traffic from the tcpreplay, even if responses are sent and received sent via another interface, so "Point A" & "Point B" need to be the same interface.
- The RTS Simulator is configured to listen an address that cannot consume the tcpreplay traffic. Verify that both the "Point A" and "Point B" addresses are set to the same value in the xdp-rts-client-sim.xml file.

**8. Why is our system unable to connect to the RTS Simulator or login rejected?**

The "Point C" or "Point D" IP addresses have been updated incorrectly in the xdp-rts-client-sim.xml file.

Please verify that the "Point C" IP address has been updated correctly in the xdp-rts-client-sim.xml file and is not currently set to the loopback address. Also please verify that the "Point D" IP address has been updated correctly in the xdp-rts-client-sim.xml file and is not set to the loopback address. This address should be set to the source address of the connection to the retransmission request.

**9. Why does the RTS Simulator reject the login from our system?**

Please refer to Question 8 above for details.



## 5 Appendix B – Multicast Channel Configuration

The multicast channel IDs, multicast addresses and port numbers presented here are for testing purposes only. The multicast address and port numbers might also be different in a different set of canned data. Users should not assume that the multicast channel IDs in production will be identical to those presented here.

Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
115 / 615	239.150.37.65:50100	239.150.37.65:50600	Contract Definition (300)	●	●	●			
	239.150.38.65:50100	239.150.38.65:50600	Outright Definition (301)						
			Strategy Definition (302)						
			Price Limits (305)						
			Trade Statistics - End of Day (351)						





Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
111 / 611	239.150.37.68:50104 239.150.38.68:50104	239.150.37.68:50604 239.150.38.68:50604	Market State - Contract (311)  Market State - Instrument (312)  Order Book Clear (327)  Top Of Book (321)  Quote Request (329)  Indicative Opening Price (320)  Market Data Trade (341)	●					



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
112 / 612	239.150.37.69:50105 239.150.38.69:50105	239.150.37.69:50605 239.150.38.69:50605	Market State - Contract (311)  Market State - Instrument (312)  Order Book Clear (327)  Aggregate Order Book (322)  Quote Request (329)  Indicative Opening Price (320)  Market Data Trade (341)		●				



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
113 / 613	239.150.37.70:50106	239.150.37.70:50606	Market State - Contract (311)			●			
	239.150.38.70:50106	239.150.38.70:50606	Market State - Instrument (312)						
			Order Book Clear (327)						
			Order Add (323)						
			Order Amend (324)						
			Order Cancel (325)						
			Order Executed (326)						
			Quote Request (329)						
			Indicative Opening Price (320)						



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
614	-	239.150.37.78:50612 239.150.38.78:50612	Market Data Trade (341)	●	●	●			
116 / 616	239.150.37.76:50110 239.150.38.76:50110	239.150.37.76:50610 239.150.38.76:50610	Trade Statistics - Intraday (352)		●	●			
135 / 635	239.150.37.59:50250 239.150.38.59:50250	239.150.37.59:50750 239.150.38.59:50750	Contract Definition (300)  Outright Definition (301)  Strategy Definition (302)  Price Limits (305)  Trade Statistics - End of Day (351)	●	●	●			



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
131 / 631	239.150.37.60:50254 239.150.38.60:50254	239.150.37.60:50754 239.150.38.60:50754	Market State - Contract (311)  Market State - Instrument (312)  Order Book Clear (327)  Top Of Book (321)  Quote Request (329)  Indicative Opening Price (320)  Market Data Trade (341)	●					



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
132 / 632	239.150.37.61:50255	239.150.37.61:50755	Market State - Contract (311)		●				
	239.150.38.61:50255	239.150.38.61:50755	Market State - Instrument (312)						
			Order Book Clear (327)						
			Aggregate Order Book (322)						
			Quote Request (329)						
			Indicative Opening Price (320)						
			Market Data Trade (341)						



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
133 / 633	239.150.37.62:50256	239.150.37.62:50756	Market State - Contract (311)			●			
	239.150.38.62:50256	239.150.38.62:50756	Market State - Instrument (312)						
			Order Book Clear (327)						
			Order Add (323)						
			Order Amend (324)						
			Order Cancel (325)						
			Order Executed (326)						
			Quote Request (329)						
			Indicative Opening Price (320)						



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
634	-	239.150.37.64:50764 239.150.38.64:50764	Market Data Trade (341)	●	●	●			
136 / 636	239.150.37.63:50260 239.150.38.63:50260	239.150.37.63:50760 239.150.38.63:50760	Trade Statistics - Intraday (352)		●	●			
200 / 700	239.153.37.180:50200 239.153.38.180:50200	239.153.37.180:50700 239.153.38.180:50700	Instrument Definition (303)  Tradable Instrument Definition (304)  Order Statistics - Intraday (350)				●	●	●





Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
205 / 705	239.153.37.185:50205 239.153.38.185:50205	239.153.37.185:50705 239.153.38.185:50705	Market State - Product (310)  Market Data Order (328)  Market Data Trade (341)  Indicative Trade Price (340)				●		
206 / 706	239.153.37.186:50206 239.153.38.186:50206	239.153.37.186:50706 239.153.38.186:50706	Business Event - Pre-TT Auction (342)				●		



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
207 / 707	239.153.37.187:50207 239.153.38.187:50207	239.153.37.187:50707 239.153.38.187:50707	Reference Price (401)  Reference Forward Curve Price (402)  Reference FX Rate (403)  Reference Volatility Price (404)					●	
208 / 708	239.153.37.188:50208 239.153.38.188:50208	239.153.37.188:50708 239.153.38.188:50708	Open Interest (420)  Open Interest Band (421)  Position Band (422)  Warrant Band (423)  Trading Volume (424)					●	



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
209 / 709	239.153.37.189:50209 239.153.38.189:50209	239.153.37.189:50709 239.153.38.189:50709	Warehouse Stock Movement (426)					●	
215 / 715	239.153.37.195:50215 239.153.38.195:50215	239.153.37.195:50715 239.153.38.195:50715	Market Data Order (328)  Market Data Trade (341)				●		
216 / 716	239.153.37.196:50216 239.153.38.196:50216	239.153.37.196:50716 239.153.38.196:50716	Business Event - Pre-TT Auction (342)				●		
217 / 717	239.153.37.197:50217 239.153.38.197:50217	239.153.37.197:50717 239.153.38.197:50717	Reference Price (401)  Reference FX Rate (403)					●	



Channel ID Realtime/ Refresh	Realtime Multicast Address & Port	Refresh Multicast Address & Port	Message Type	LME Level 1	LME Level 2	LME Level 3	Inter-office and ring	Premium	Reference Data
218 / 718	239.153.37.198:50218 239.153.38.198:50218	239.153.37.198:50718 239.153.38.198:50718	Open Interest (420) Open Interest Band (421) Position Band (422) Warrant Band (423) Trading Volume (242)					●	
307 / 807	239.153.37.207:50307 239.153.38.207:50307	239.153.37.207:50807 239.153.38.207:50807	Reference Auction Price (405)					●	
81 / NA	239.150.37.80:50081 239.150.38.80:50081	-	DR Signal (105)	●	●	●	●	●	●

● Product related channel

**Note:** Depending on the order and trade activities, some channels may have minimal or no trading data just heartbeats. This is expected behaviour.

