

M7 Load Management Webinar

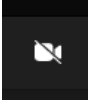
*A flexible and transparent scheme accompanying
intraday trading digitalisation*

10th March 2022

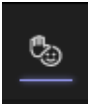


Housekeeping Rules

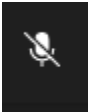
✓ *Keep your video switched **off***



✓ *Questions will be taken at the end of the presentation during Q & A section*



✓ *Keep your line muted unless asking a question*



Panellists

Florian Brunzlow – Intraday Market Expert

Xavier Guille – Senior Business System Analyst

Jean-Marc Pournin – Sales & Market Data - API
Customer Services

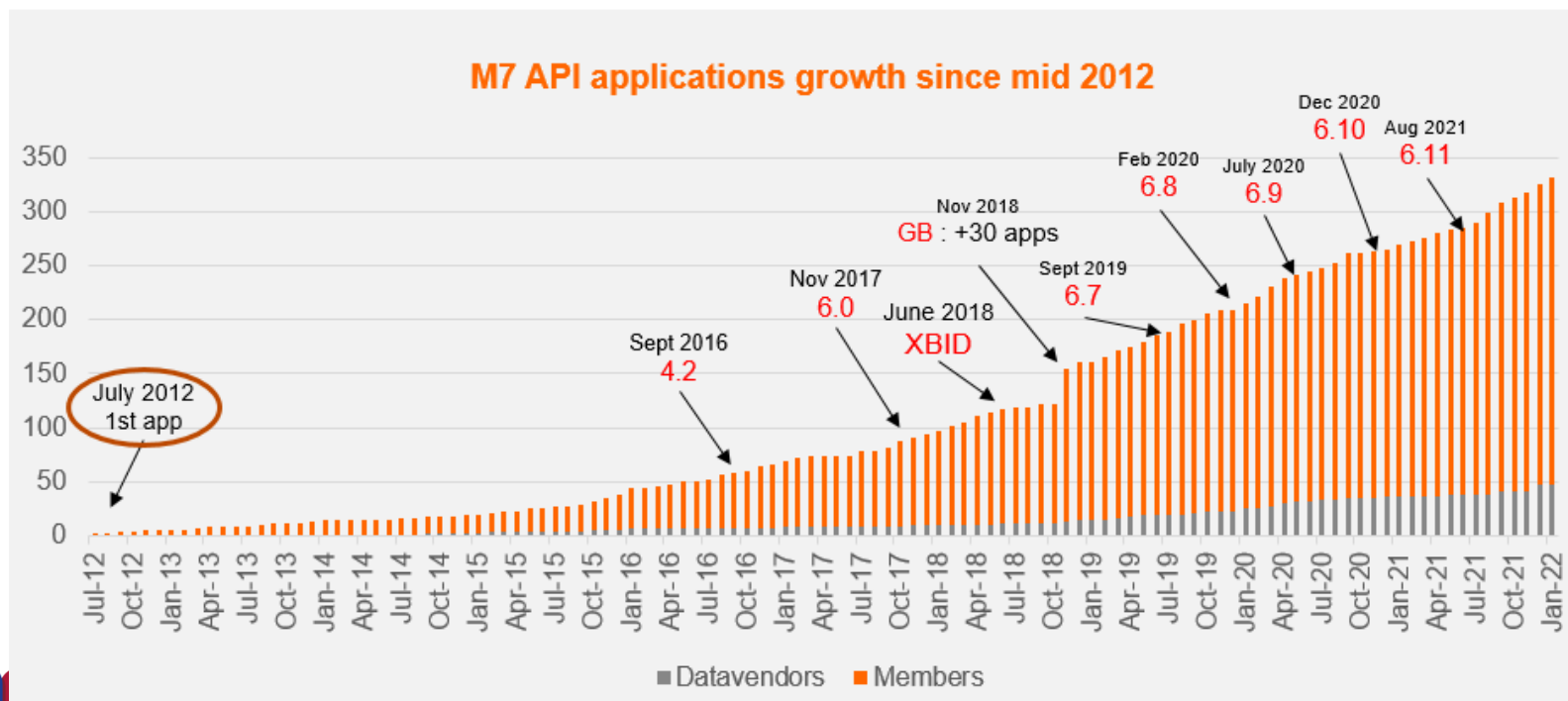
Agenda

- 1. Introduction**
2. Principles & Scenarios
3. API Implementation
4. Member Testing
5. Go-live Parameters
6. Q&A Session

Introduction

API apps – a 25% growth per year

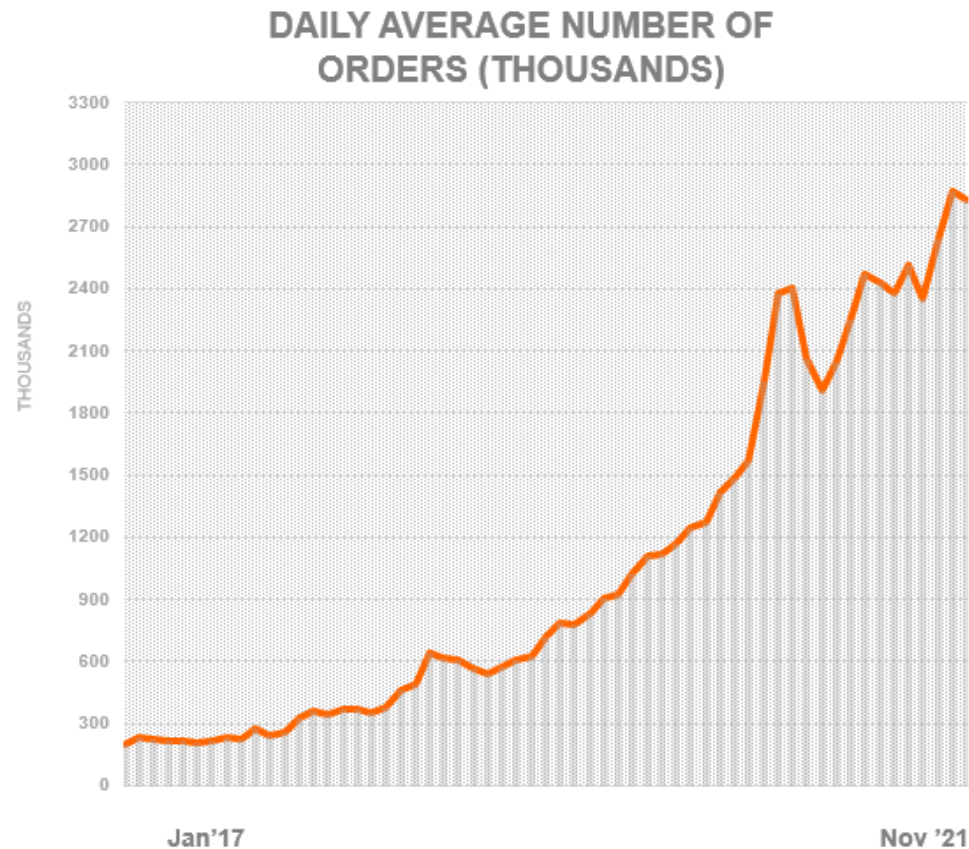
- Today **300+ API applications** are connected to M7:
 - following the market and positions (pure read-only: 40%)
 - and/or **automating trading strategies**



Introduction

Orders – a 75% growth per year

On average, **2,800,000+ orders** daily on M7
97% of orders come from API applications



Introduction

New M7 API load management solution in a nutshell

1/ PREDICTABLE

Members API orders allowance

2/ TRANSPARENT

Members can query on M7 where they stand on their current order consumption

- ✓ Transparent, accurate and real-time self-monitoring

3/ PROPORTIONATE

Members get first alerts when order limit is reached ; order rejection happens only if the breach is prolonged or further exceeded – and back to normal as soon as the limit is respected

- ✓ Warning first so member can react
- ✓ Only API order submission is paused, ComTrader always open
- ✓ Automatic recovery to normal trading

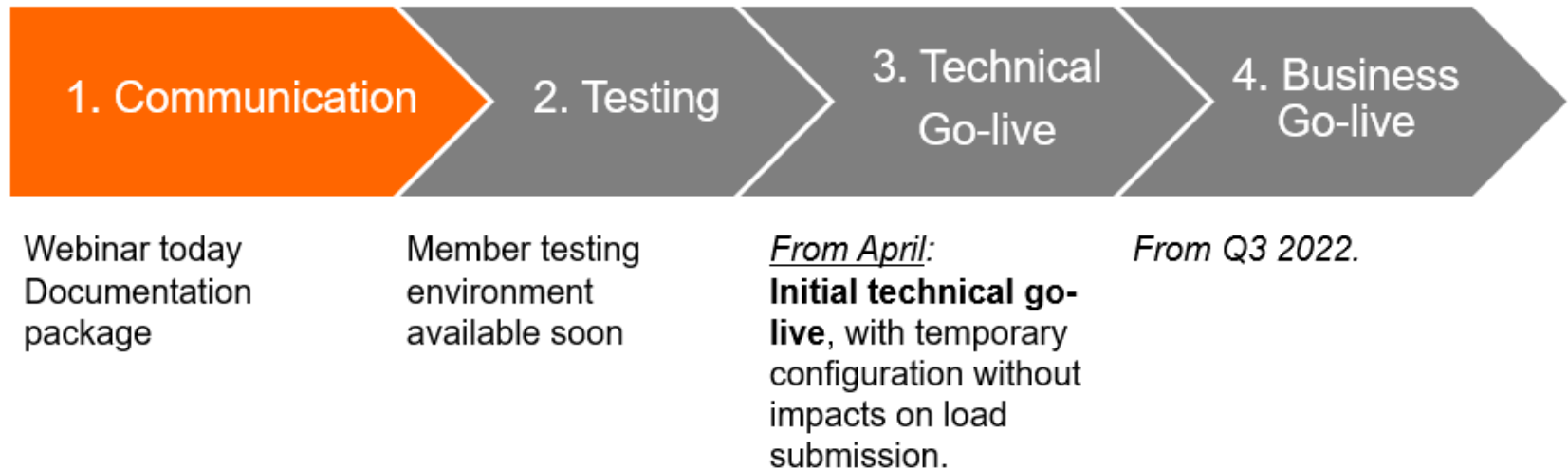
4/ SAFE

A shorter time period monitoring is provided (10 seconds rolling) to detect short-term load burst

- ✓ Helps early detection and prevention of critical algo-incidents (bugs...)

Introduction

High-level target timeline



Agenda

1. Introduction
- 2. Principles & Scenarios**
3. API Implementation
4. Member Testing
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Principles & Scenarios

M7 API Load Management

❑ What does it do?

- ❑ What are OMTs?
- ❑ How does it work?
- ❑ What may happen if a Member breaches the limit?
- ❑ What may happen to the Member's active orders in case of OMT Restriction?
- ❑ Can a Member keep placing orders via ComTrader even in case of OMT Restriction?

Main principles

Allows to automatically control the number of orders (« OMTs ») submitted by Members in M7

Principles & Scenarios

M7 API Load Management

❑ What does it do?

❑ What are OMTs?

❑ How does it work?

❑ What may happen if a Member breaches the limit?

❑ What may happen to the Member's active orders in case of OMT Restriction?

❑ Can a Member keep placing orders via ComTrader even in case of OMT Restriction?

Main principles

- One OMT (Order Management Transactions) corresponds to any creation, modification or deletion of an order triggered by a User on M7 (whether it is via ComTrader or via API).
- The orders load (i.e., OMT count) considered in the M7 Load Mgmt. feature only counts the OMT submitted via a M7 API over an observation period.
- Any of the above actions submitted via ComTrader is not considered as part of the OMT count.

Principles & Scenarios

M7 API Load Management

- ❑ What does it do?
- ❑ What are OMTs?

❑ How does it work?

- ❑ What may happen if a Member breaches the limit?
- ❑ What may happen to the Member's active orders in case of OMT Restriction?
- ❑ Can a Member keep placing orders via ComTrader even in case of OMT Restriction?

Main principles

Thresholds will be configured (and other parameters) to the OMT count that can be submitted by any given Member (per ECC code) over 2 different rolling periods of times, called « Observation Windows » or « OW » (Long and Short)

- the **Short OW** will be 10 seconds
- the **Long OW** will be 24 hours

2 types of **thresholds** for each OW

- A **lower threshold « L1 »**: a number x of OMTs
- An **upper threshold « L2 »**: a number y of OMTs ($y > x$)

2 additional **parameters** for each OW

- A **Tolerance Period**: a period over which a Member is allowed to submit orders **above L1** (but not L2)
- A **Cooldown Period**: the minimal period during which OMT Restriction applies to a Member

Principles & Scenarios

M7 API Load Management

- What does it do?
- What are OMTs?
- How does it work?
- What may happen if a Member breaches the limit?**
- What may happen to the Member's active orders in case of OMT Restriction?
- Can a Member keep placing orders via ComTrader even in case of OMT Restriction?

Main principles

Warnings, OMT Restriction, and in extreme cases, Protective suspension (User) – see next slides for more details

Principles & Scenarios

M7 API Load Management

- What does it do?
- What are OMTs?
- How does it work?
- What may happen if a Member breaches the limit?
- What may happen to the Member's active orders in case of OMT Restriction?**
- Can a Member keep placing orders via ComTrader even in case of OMT Restriction?

Main principles

Users can define different actions at each Login – see next slides for more details

Principles & Scenarios

M7 API Load Management

- What does it do?
- What are OMTs?
- How does it work?
- What may happen if a Member breaches the limit?
- What may happen to the Member's active orders in case of OMT Restriction?
- Can a Member keep placing orders via ComTrader even in case of OMT Restriction?**

Main principles

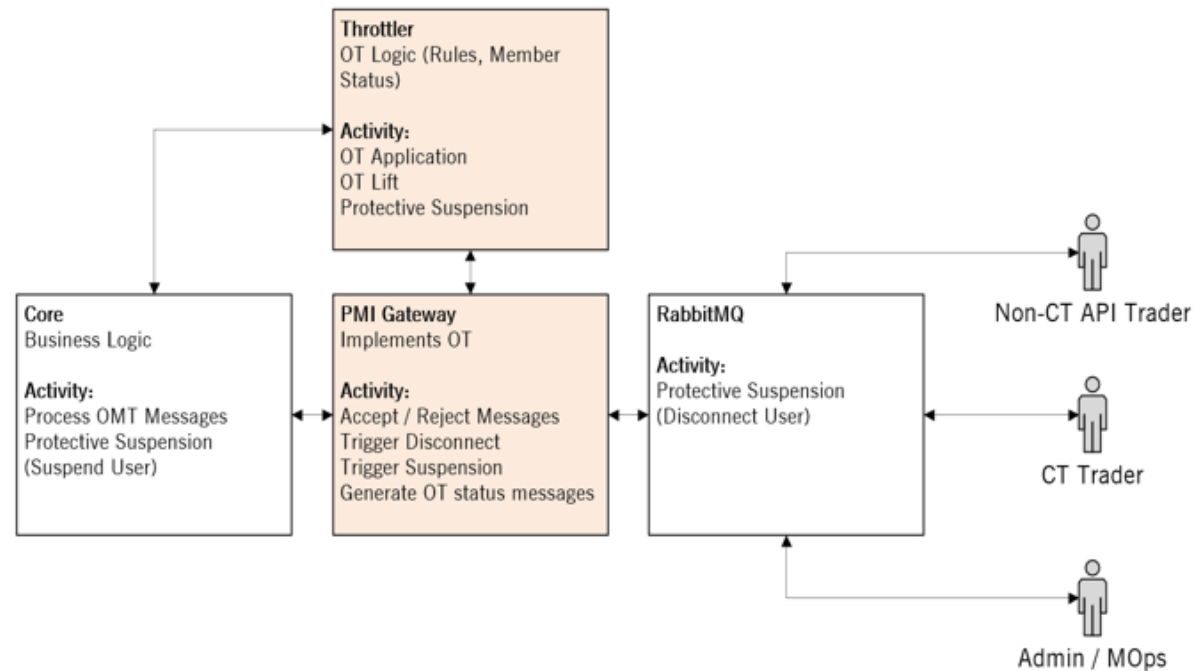
Yes, OMTs via ComTrader will always remain available to Members

Principles & Scenarios

M7 API Load Management – Technical setup

□ 2 new components

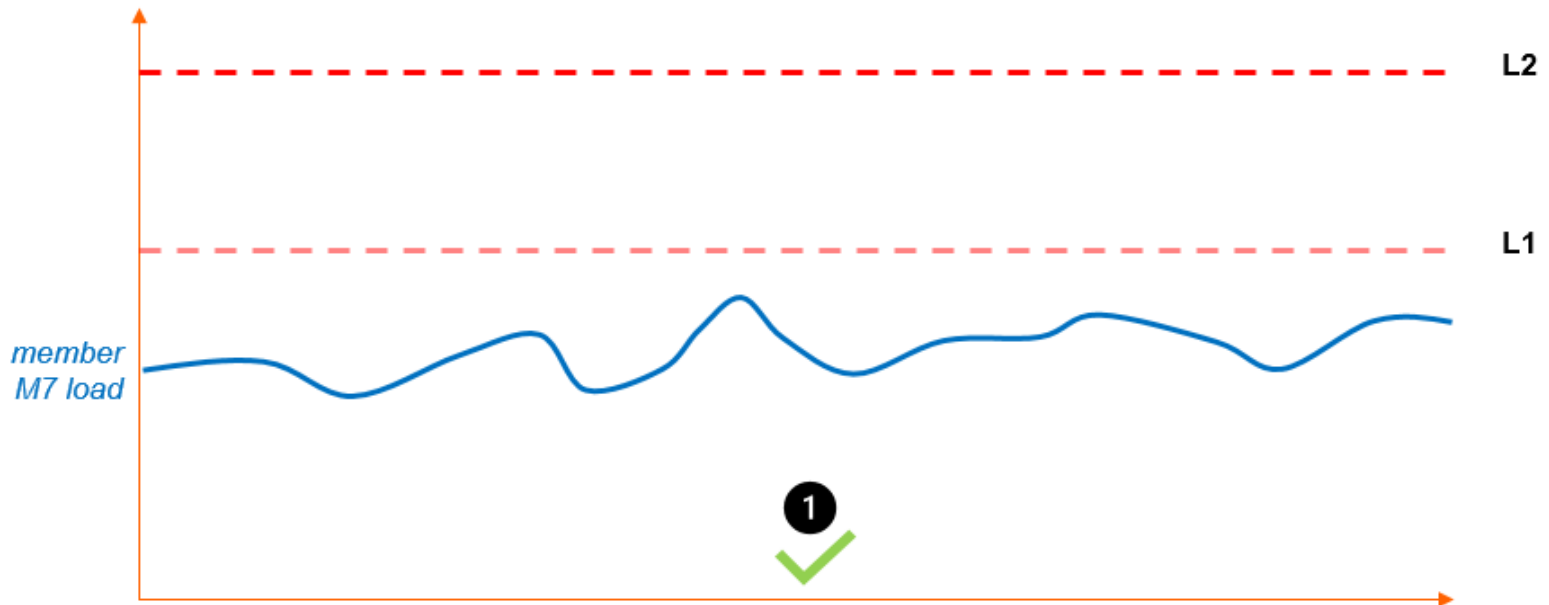
- Throttler
- PMI Gateway



System0	Means of Protection	Offender
Core	<ul style="list-style-type: none"> • Warnings • OMT Rejection 	<ul style="list-style-type: none"> • Member
PMI Gateway	<ul style="list-style-type: none"> • Suspension • Disconnection 	<ul style="list-style-type: none"> • User

Principles & Scenarios

Scenario 1 – Below L1



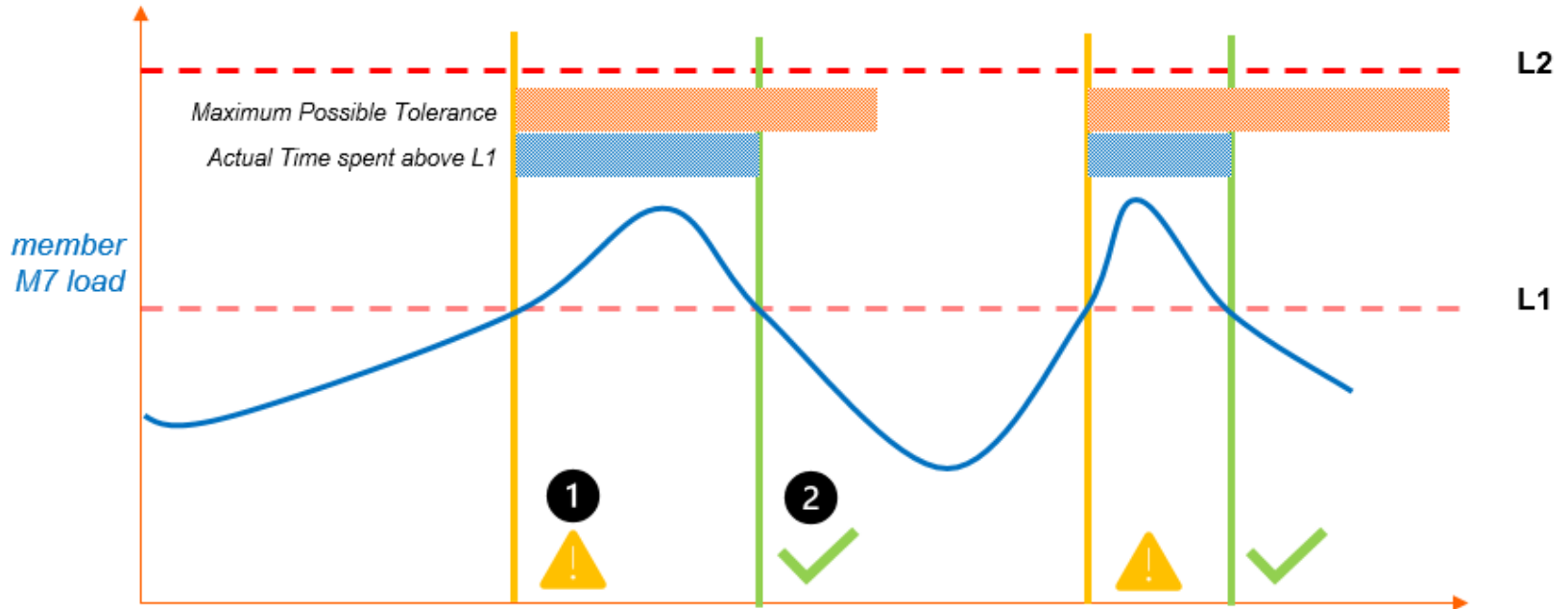
- 1
- All good
 - All OMTs accepted

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

Member M7 load : rolling count of « total » OMTs (accepted + rejected) per OW

Principles & Scenarios

Scenario 2 – Above L1 and back below before Tolerance expiry

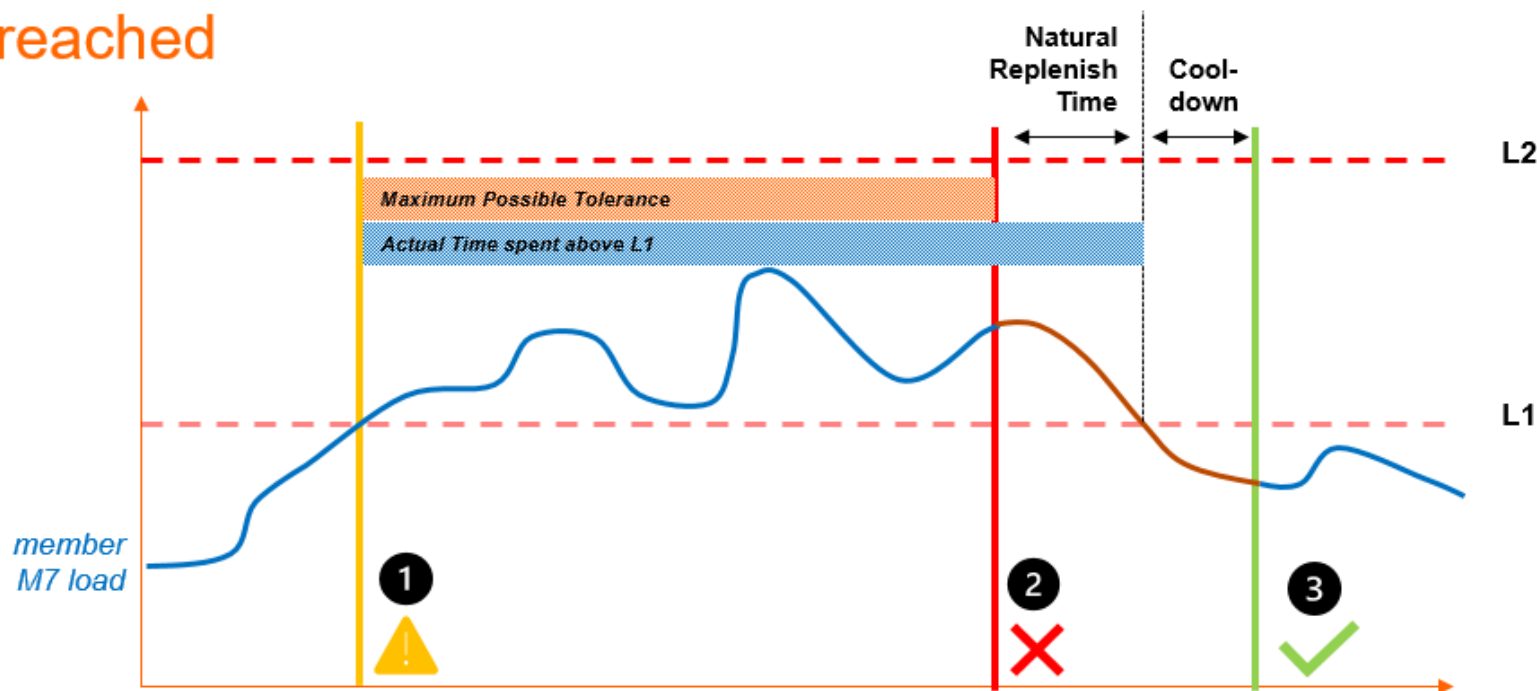


- 1** • Warning triggered
• Message sent to Member (all Users)
• Start of Tolerance countdown
- 2** • Warning lifted (no message)
• Tolerance reset when Rolling Count of OMTs goes below L1

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

Principles & Scenarios

Scenario 3: Above L1 continuously till Tolerance expiry reached



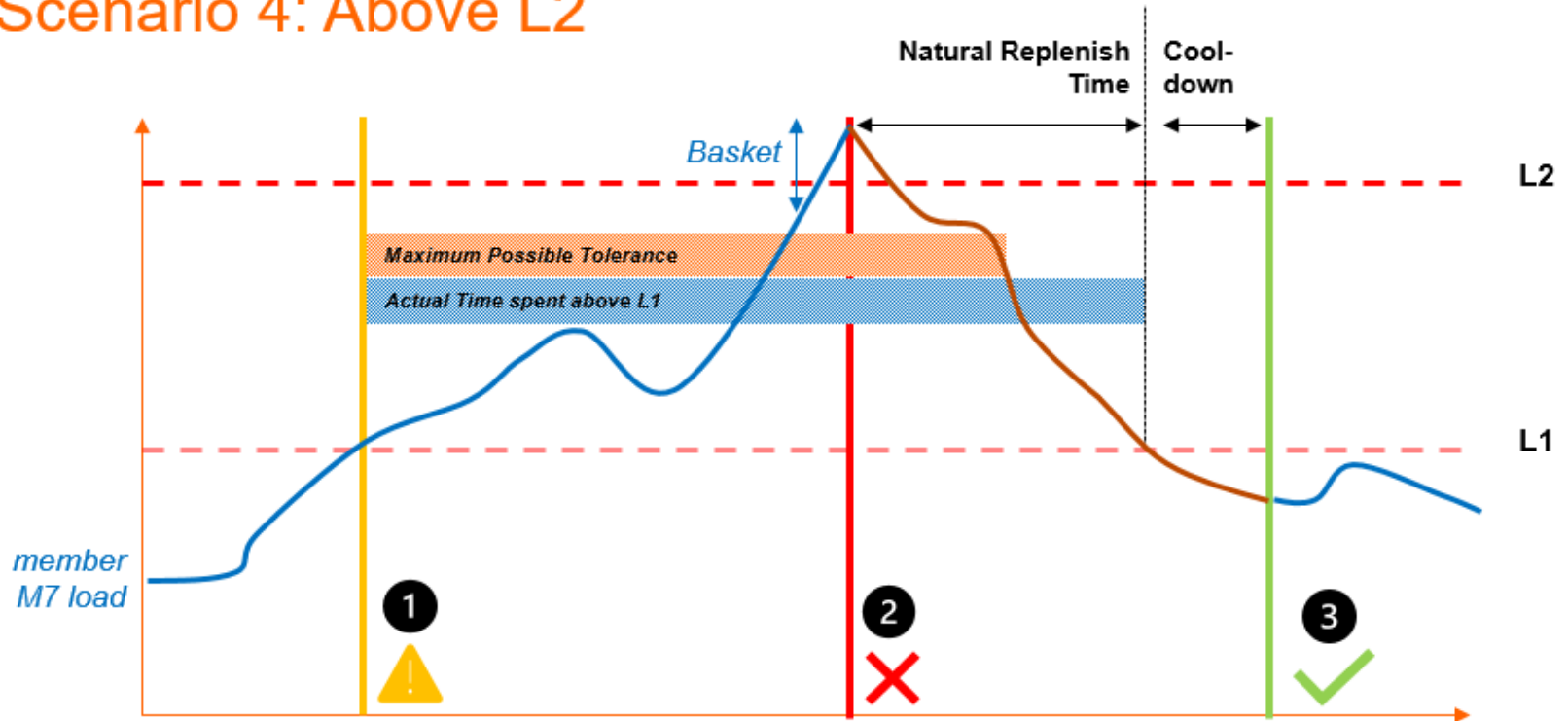
- 1 • Warning triggered
• Message sent to Member (all Users)
• Start of Tolerance countdown
- 2 • OMT rejected
- 3 • OMT accepted

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

Natural Replenish Time: variable period between the moment the throttling applies and the moment the Rolling count of OMTs goes back below L1. It depends on the past trading activity.

Principles & Scenarios

Scenario 4: Above L2

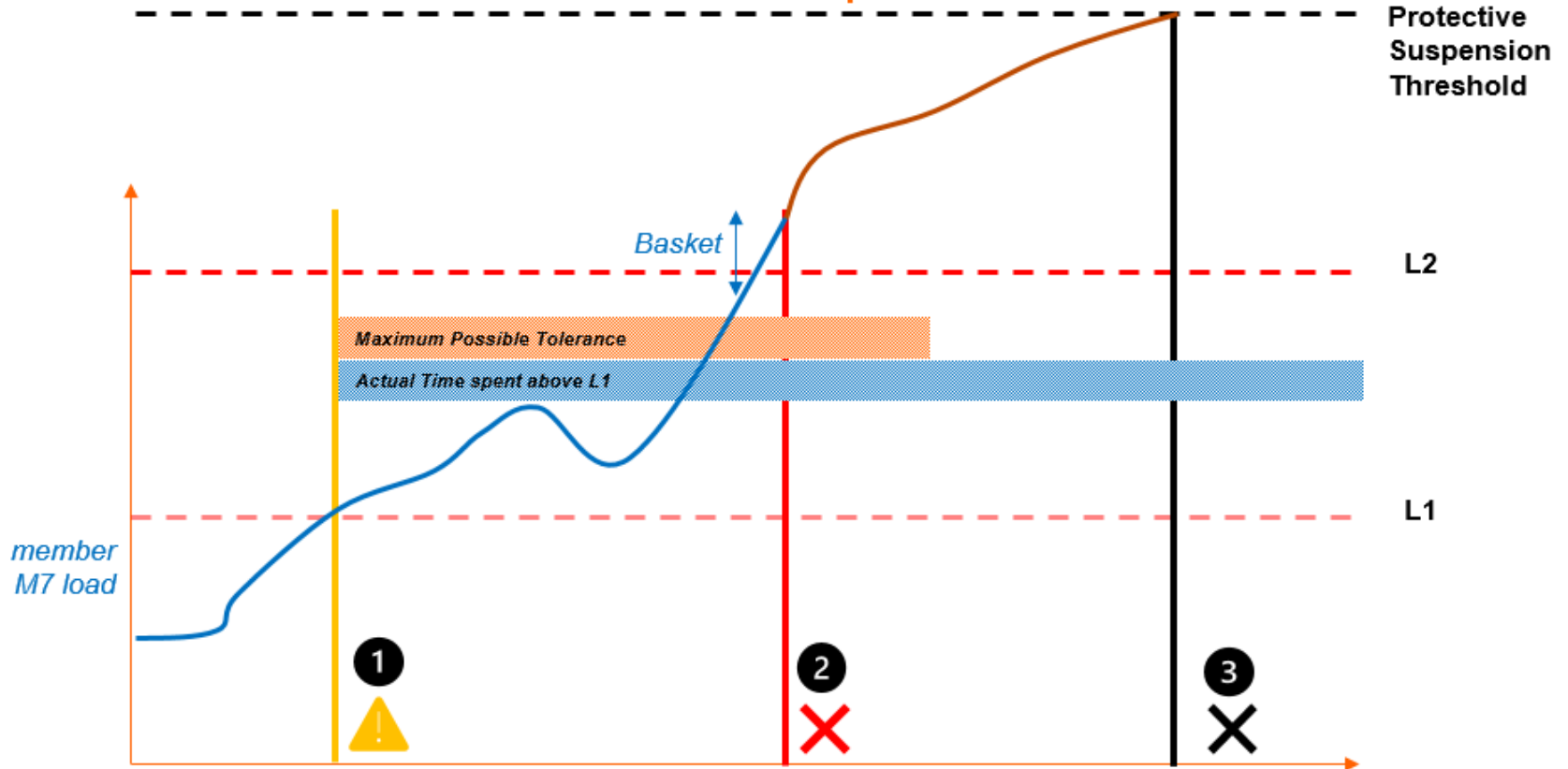


- 1 • Warning triggered
• Message sent to Member (all Users)
• Start of Tolerance countdown
- 2 • OMT rejected
- 3 • OMT accepted

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

Principles & Scenarios

Scenario 5: Above L2 and above protective threshold



- 1 • Warning triggered
• Message sent to Member (all Users)
• Start of Tolerance countdown
- 2 • OMT rejected
- 3 • User suspended/disconnected

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

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API Implementation

Load Mgmt. API ecosystem for R/W API apps

1

2 New Login Request options

Note : RO apps do not need to be updated.
Just perform regression tests as usual

Keep control of your API orders, should you get restricted

« If my member gets restricted, I want my/all my BG/all members orders to get hibernated »

2

Throttling Status Request / Response

Know your Load situation (every 3 seconds max TBC)

Response : short L1 = xxx, OMT = yyy, ... Long L1 = ... End of TP = ... etc.

3

2 new Message Reports

Be informed in real time of status changes

- Message #168 : « warning », « restricted », #166: back to « no restriction »
- Text + variables (DFS200)

4

order rejections: ErrResp in response Q

Order management requests can get rejected once restricted

Order management request

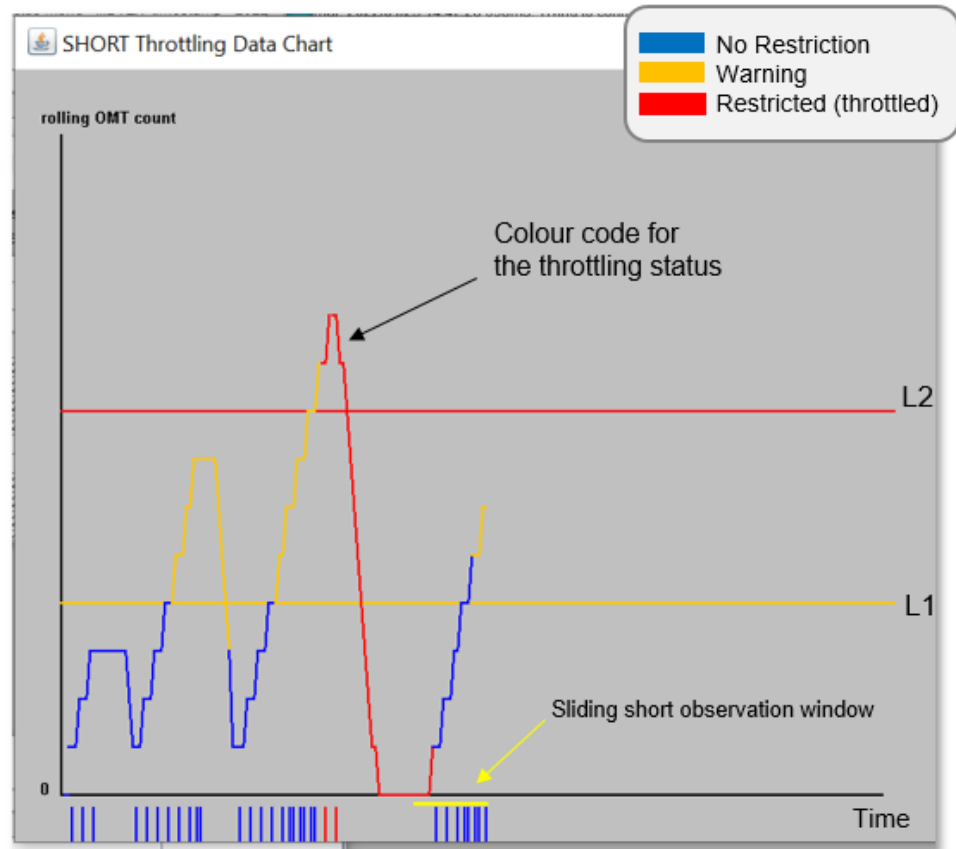
ErrResp in response queue instead of AckResp

M7 6.12
API

API Implementation

Load Mgmt. API impacts

Example: Graph built off periodic Throttling Status Response data (short rule)



1 bar = 1 order submission attempt

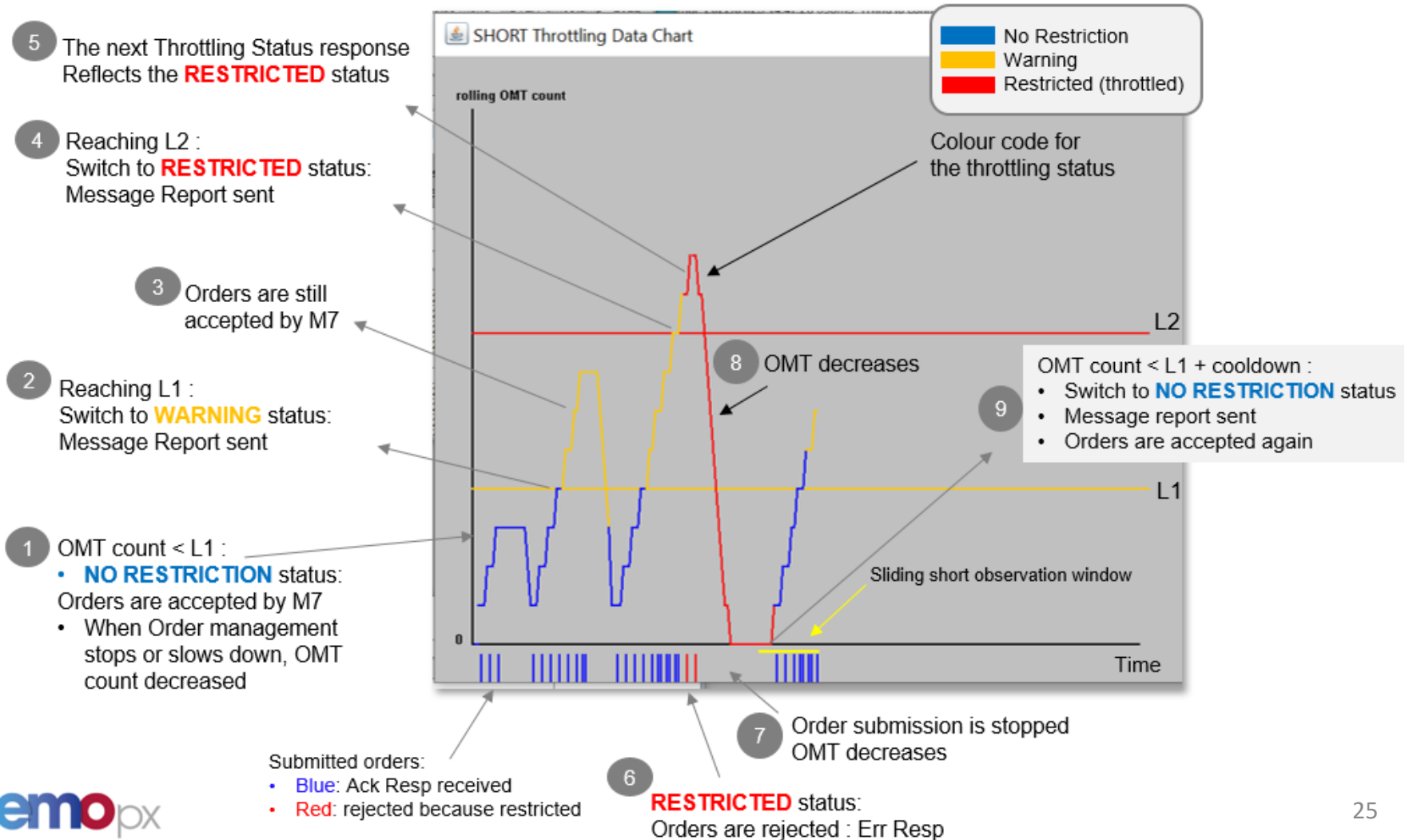
- Blue: Ack Resp received
- Red: ErrResp: rejected because restricted

Note: it is still possible after an AckResp to get a « logical » Error (ErrResp as a broadcast, e.g., when submitting an order on a closed contract)
Anyway **all « order action attempts » are counted**

API Implementation

Load Mgmt. API impacts

Example: Graph built off periodic Throttling Status Response data (short rule)



API Implementation

Load Mgmt. API impacts

LoginReq new options

- **Login Request new options:** it is possible to define when logging in the desired behaviour regarding the impacted member API orders when being throttled.
 - **Possible actions:** nothing, or hibernate API orders
 - **Action scope:** at user level, BG level (all BGs assigned to the throttled/Logged in API user), all API orders of the throttled member (please refer to DFS180 for more details).
- **sample request:**

```
<LoginReq xmlns="http://www.deutsche-boerse.com/m7/v6" user="M7JMPAC5" force="true" disconnectAction="NO"  
throttlingUserAction="HIBE_BG_ORDERS" throttlingMemberAction="NONE_MBR_ORDERS">  
<StandardHeader marketId="EPEX"/>  
</LoginReq>
```

- Caution : the last logged in user will enforce the throttling behaviour (consistency between users is required)
- **New attributes are optional:** no need to amend Read Only API apps

API Implementation

Load Mgmt. API impacts

A new Throttling Status Request/Response

- **Sample Request:**

```
<ThrottlingStatusReq xmlns="http://www.deutsche-boerse.com/m7/v6">  
<StandardHeader marketId="EPEX"/>  
</ThrottlingStatusReq>
```

- Please pay attention to the **new *m7.request.inquiry.throttling* Routing Key** required to send that request, otherwise you will get an error (DFS180):

6.5.1 ThrottlingStatusReq

- Type: Inquiry Request
- Routing Keys: *m7.request.inquiry.throttling*
- Roles: Trader

- **Inquiry throttling request rate limit:**

- works differently from existing “inquiry” requests:
- the request is NOT listed in the System Info Response message, since it has a different count mechanism:

- Requests are counted at User level
- **A minimum of 3 seconds between 2 Throttling Status Req per user** (interval TBC)
- More frequent requests will be rejected

API Implementation

Load Mgmt. API impacts

A new Throttling Status Request/Response

- **Sample Response:**

```

<ThrottlingStatusResp xmlns="http://www.deutsche-boerse.com/m7/v6">
  <StandardHeader marketId="EPEX"/>
  <ThrottlingMemberStatus mbrId="MDTEX" timestamp="2022-03-02T17:26:38.001Z" status="NO_RESTRICTION">
    <ShortRule observationPeriodLength="7" tolerancePeriodLength="4" reconnectionCoolDown="20" omtLimitL1="3" omtLimitL2="10">
      <Status status="NO_RESTRICTION" currentOmtCount="2"/>
    </ShortRule>
    <LongRule observationPeriodLength="86400" tolerancePeriodLength="10800" reconnectionCoolDown="10800" omtLimitL1="1000" omtLimitL2="2000">
      <Status status="NO_RESTRICTION" currentOmtCount="59"/>
    </LongRule>
  </ThrottlingMemberStatus>
</ThrottlingStatusResp>
  
```

situation from the throttler perspective at "timestamp"

Member status

Short rule status

Long rule status

Short ad long rolling OMT counts

Note: the **release timestamp** corresponds to:

- The end of the tolerance period when status = WARNING
- The end of throttling when status = RESTRICTED

Internal API app approximation:

- **Can never be 100% accurate** (e.g., time seen from the client side)
- **The M7 Throttler count cannot be exactly duplicated**
- See DFS230 for OMT calculation details (order events and messages, « bucket » concept)

- "Table" view of the response :

RULE	Release Time	Status	OMT count	L1	L2	Observation	Tolerance	Cooldown
GLOBAL:	N/A	NO_RESTRICTION	Short OMT Approx. = 1					
SHORT RULE:		NO_RESTRICTION	1	3	10	7	4	20
LONG RULE:		NO_RESTRICTION	211	1000	2000	86400	10800	10800

API Implementation

Load Mgmt. API impacts New Message Reports (DFS200)

- Alerting all users of a given member ("PUBLIC") about a **throttling status change**:
 - transition to **WARNING** or to **RESTRICTED**, precising for which rule the event takes place
 - or to **NO_RESTRICTION**.
- Message reports are not new, but so far were essentially displayed in apps having a GUI.
- Example when receiving a WARNING: **text and variables/parameters** (avoid parsing):

```
<MsgRprt xmlns="http://www.deutsche-boerse.com/m7/v6">
  <StandardHeader marketId="EPEX"/>
  <MsgList>
    <Msg msgId="14435" type="PUBLIC" messageCode="168" timeStamp="2022-02-09T18:55:16.557Z" svrty="HIG"
      txt="Throttling status changed for MDTEX to WARNING at 2022-02-09T19:55:16.532+01:00,
      short rule (status=WARNING, end of tolerance:2022-02-09T19:55:39.012+01:00) and long rule (status=NO_RESTRICTION),
      last user: M7JMPAC4, last member client correlation id: THROTTLING_#10_19:55:15.543 " mktSupervisionMsg="false">
      <VarList>
        <Var id="0" value="TRD001"/>
        <Var id="2" value="Sell"/>
        <Var id="14" value="0"/>
        <Var id="18" value="MW"/>
        <Var id="20" value="MDTEX"/>
        <Var id="26" value="WARNING"/>
        <Var id="27" value="2022-02-09T19:55:16.532+01:00"/>
        <Var id="28" value="status=WARNING, end of tolerance:2022-02-09T19:55:39.012+01:00"/>
        <Var id="29" value="status=NO_RESTRICTION"/>
        <Var id="30" value="M7JMPAC4"/>
        <Var id="31" value="THROTTLING_#10_19:55:15.543"/>
        <Var id="99001" value="0.00"/>
        <Var id="99003" value="0"/>
        <Var id="99004" value="0"/>
        <Var id="99005" value="0"/>
      </VarList>
    </Msg>
  </MsgList>
</MsgRprt>
```

Variable details in DFS200
« Parameters » section

User and order correlation Id
that triggered the status change

26	Order Throttling - Member Status
27	Order Throttling - Rule Type
28	Order Throttling - Member Status, time of change
29	Order Throttling - Indicative Release time / End of Tolerance
30	Order Throttling - Responsible User
31	Order Throttling - Client Correlation ID
32	Order Throttling - Release Time / End of Tolerance flag (defines content of field 29)

API Implementation

Load Mgmt. API impacts

New Message Reports examples

Message code #168:

- 2022/03/07 19:22:45.602ms: msgId=17423 **messageCode=168** type=PUBLIC svrty=HIG
"Throttling status changed for MDTEX to **WARNING** at 2022-03-07T19:22:45.310927+01:00,
short rule (status=WARNING, end of tolerance:2022-03-07T19:22:49.275679+01:00)
and long rule (status=NO_RESTRICTION), last user: M7JMPAC4, last member client correlation id:
THROTTLING_#7_19:22:45.245 "
- 2022/03/07 19:22:49.592ms: msgId=17424 **messageCode=168** type=PUBLIC svrty=HIG
"Throttling status changed for MDTEX to **RESTRICTED** at 2022-03-07T19:22:49.33479+01:00,
short rule (status=RESTRICTED, release time:2022-03-07T21:23:14+01:00)
and long rule (status=NO_RESTRICTION), last user: M7JMPAC4, last member client correlation id:
THROTTLING_#11_19:22:49.251 "

Message code #166:

- 2022/03/07 21:24:27.092ms: msgId=17425 **messageCode=166** type=PUBLIC svrty=HIG
"Throttling status changed for MDTEX to **NO_RESTRICTION** at 2022-03-07T21:24:27.01943+01:00"

API Implementation

Load Mgmt. API impacts

Documentation

- To get an introduction to the Load Mgmt. functionality, please refer to the M7 package, updated with:
 - the Load Mgmt. User Guide
 - DFS230 for functional Load Mgmt. explanations
 - DFS180 for more message details
 - DFS200 for new messages details (message reports)
 - The 6.12 XSD file (new request)
 - List of open issues and bug fixes (still under test)

API Conformance Tests

- Only mandatory for ISVs



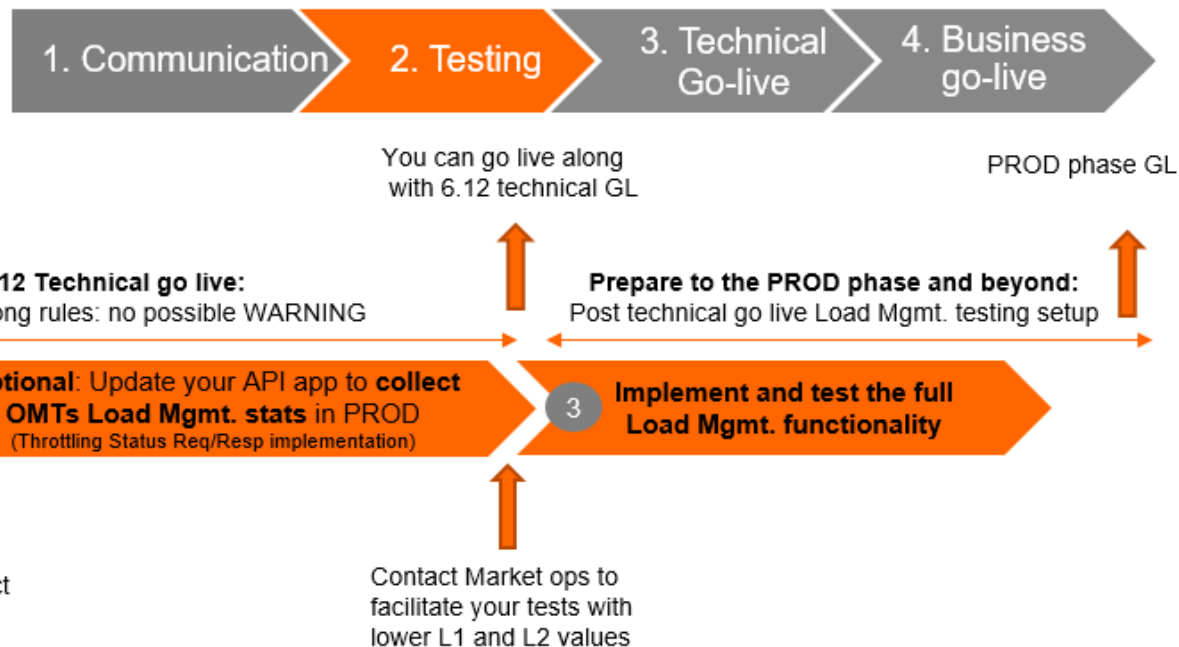
DEMO

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Member Testing

Member Testing



3 phases in the ASIM test environment:

- 1) **Regression Tests** to prepare to the M7 6.12 technical go-live
- 2) **Optional : implementation** as of the M7 6.12 technical go-live of **Throttling Status Requests** to collect OMT data based on your current trading strategies and activities:
 - 6.12 will enable to send Throttling Status Requests: even if you will not get any WARNING at all during that phase it may still be interesting for you to observe the OMT count calculated by M7 with your current production activity, on top of your own internal assessment of your load.
- 3) **Full Implementation and test of the Load Mgmt. functionality**
 - Note: customers must contact MO when reading to lower their short and long rules L1 and L2 thresholds values (to ease their testing activities)

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Go-live Parameters

Go-live parameters

1. Communication

2. Testing

3. Technical Go-live

4. Business go-live

M7 parameters		Technical go-live value	Business go-live value
Long (member level)	L_OP (Observation Period)	24 h	24 h
	L_TP (Tolerance period)	0 sec	0 sec
	L_CP (Cooldown period)	0 sec	0 sec
	L_L1	9 999 999 OMT	5 000 OMT
	L_L2	9 999 999 OMT	5 000 OMT
Short (member level)	S_OP (Observation Period)	10 sec	10 sec
	S_TP (Tolerance period)	0 sec	0 sec
	S_CP (Cooldown period)	0 sec	0 sec
	S_L1	9 999 999 OMT	100 OMT
	S_L2	9 999 999 OMT	100 OMT
Protective suspension (user level)	PS (messages/sec)	9 999 999 msg	to be confirmed

Questions?

Any additional queries or feedback after this webinar can be emailed to: info@semopx.com.



Thank you all for attending!