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A **BELDEN** BRAND

MORPHEUS

BXF IMPLEMENTATION CONFIGURATIONS

Engineering Manual Supplement

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1 Introduction

This document provides example configurations for environments in which BXF services are integrated.

The purpose of the Engineering Manual Supplement is to describe in full the details of new product features ahead of programmed releases of the Morpheus Engineering Manual.

It ensures that technical staff remain fully up to date with ongoing software and hardware developments, understand the purpose of the technology, and are able to implement new features as soon they become available.

The contents of this document will be published in full in the next release of the Morpheus Engineering Manual.

BXF Synchronisation



BXF Synchronisation Designs

This chapter analyses some of the different resilience mechanisms that use BXF services in order to duplicate a schedule from one channel onto another.

For extensive information relating to the individual BXF services, refer to the Morpheus Engineering Manual Supplement: BXF Service Configurations.

Note: Although based upon actual deployments, the examples contained herein are intended as illustrations only. The diversity of customer environments coupled with the versatility of the services requires that a BXF software development specialist must ratify all customer designs.

BXF Overview

BXF (**B**roadcast **eX**change **F**ormat) standardises the communication of three types of data exchange:

- Schedule and As-Run information
- Content metadata
- Content movement instructions

BXF provides the following benefits:

- A single method of exchanging data among systems such as Program Management, Traffic, Automation, and Content Distribution
- Support for file and message based (dynamic) data exchange
- Increased integration of related systems

There is no provision within the BXF specification for the definition of hardware, channels, or Morpheus event types within a message. This renders the protocol independent of vendor specific environments, and provides the flexibility for disparate broadcast systems to communicate effectively. In contrast to a Panoplay environment, for example, where both systems must be identical, a translation mechanism allows for different events to be associated over BXF for the purposes of synchronising a schedule between a Source and Target system.

Note: Additional translation mechanisms are able to be developed in accordance with the specifications of each requirement.

BXF Synchronisation Mechanisms

The BXF schedule synchronisation process is supported by the following Morpheus redundancy mechanisms:

- **N+1**

The current state of the schedule on the channel from which this mode was selected is synchronised once only with the first flexible channel to respond from all available EventStores, including those on the same Morpheus system. Any subsequent changes to the schedule are not synchronised.

This mode does not require Panoplay.

Note: Although a standard configuration would use Flexible channels, a customised Workflow could call upon any other type of channel according to particular design requirements.

- **Tertiary**

The state of the schedule on the channel from which this mode was selected is constantly synchronised with the first flexible channel to respond from all available EventStores, including those on the same Morpheus system. Any further change to the schedule is reproduced on the elected flexible channel.

This mode does not require Panoplay.

- **MultiSite Sync**

The schedules on preselected channels on a Target Panoplay system are synchronised with those of a live Source Panoplay system, typically on a different site for disaster recovery purposes.

Note: The Tertiary synchronisation mechanism, without the use of flexible channels, is used in the core of a MultiSite Sync environment.

All of the different BXF Synchronisation mechanisms described herein can be further customised to provide a unique technical solution that is matched to the customer requirement and their system architecture.

Details that are specific to current implementations can be found in the following sections:

- Operation of N+1 Synchronisation Mode
- Operation of Tertiary Synchronisation Mode
- Operation of MultiSite Sync Mode

Terminology

- **Leader**

The Morpheus system in a Panoplay environment that is broadcasting to air.

- **Follower**

The Morpheus system in a Panoplay environment that is not broadcasting to air.

- **Source**

The Morpheus system that is the supplier of one or more schedules and schedule updates to the Target.

In a MultiSite Sync environment, the Panoplay Leader is always the Source.

Note: Schedule updates are dependent upon the selected sync mode.

- **Target**

The Morpheus system that is the receiver of one or more schedules and schedule updates from the Source.

In a MultiSite Sync environment, the Panoplay Leader is always the Target.

Note: Schedule updates are dependent upon the selected sync mode.

- **Flexible Channel**

A channel designation. When configured as 'flexible', the channel is uncommitted to a particular role and is therefore available to be used as the clone of a dedicated channel for the purpose of resilience.

Initiating BXF Synchronisation

Depending upon the selected mode, synchronisation is initiated using either the Editor MIP panel or the MultiSite Control User Interface.

Refer to the individual synchronisation modes for details:

- Operation of N+1 Synchronisation Mode
- Operation of Tertiary Synchronisation Mode
- Operation of MultiSite Sync Mode

Operation of N+1 Synchronisation Mode

Following a button press on the Source channel MIP (Figure 2-1), the BXF N+1 mechanism performs a single, non-recurring, schedule transmission to the Target channel. In order to repeat the operation, BXF N+1 Sync must be cancelled on the channel and then re-activated.

Note: The Source system is always the on-air system.

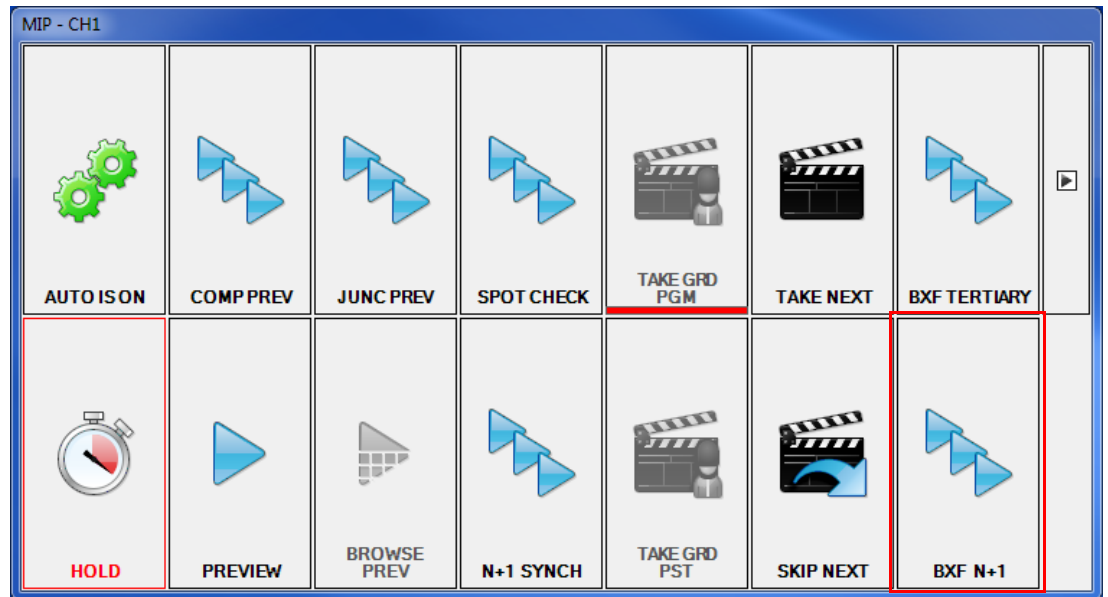


Fig. 2-1: Editor MIP BXF N+1 Synchronisation

Note: Once the **BXF N+1** sync button has been pressed, and the synchronisation has been successful, it is replaced with a **Cancel** button, and the **BXF Tertiary** button is greyed out.

N+1 Operation Phase1: Channel Discovery

The system performs the following initial non-BXF tasks in order to initiate the channel synchronisation process (Figure 2-2):

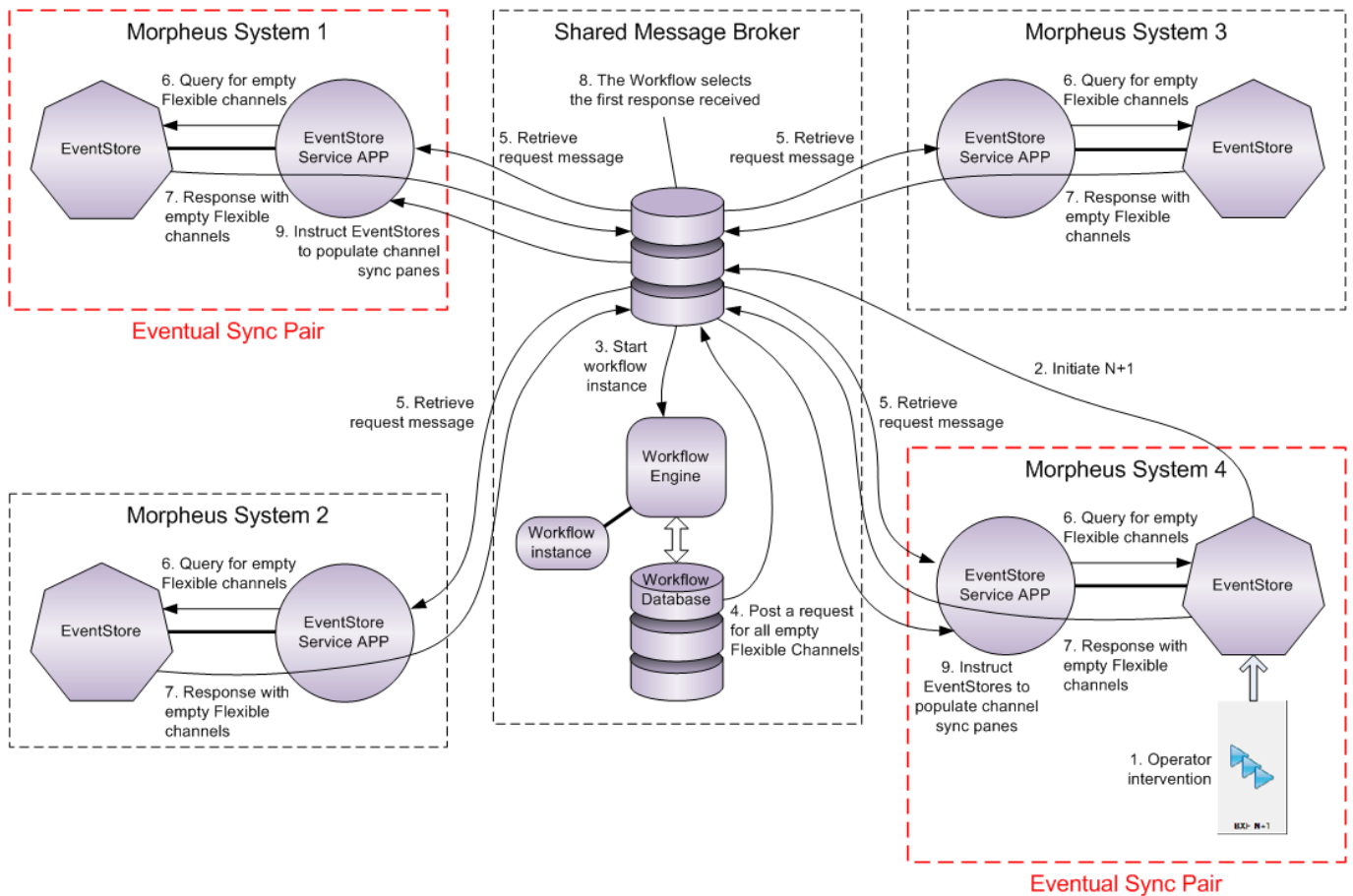


Fig. 2-2: N+1 - Flexible Channel Discovery

1. The operator selects **N+1** from the Manual Intervention Panel on the Source Morpheus system (in this example, synchronisation is initiated from Morpheus system number 4).
2. The local EventStore transmits a message to the shared Message Broker Database requesting that N+1 synchronisation is initiated.
3. The Message Broker sends a message to the Workflow Engine requesting that a Workflow is instantiated to coordinate the channel synchronisation process.
4. The Workflow Database posts a request onto the shared Message Broker Database for all subscribing EventStores to respond with their availability of empty Flexible channels.
5. Each EventStore Service App retrieves the message from the Message Broker Database.
6. Each EventStore Service App queries their local subscribing EventStores.
7. The EventStores respond with the available empty Flexible channels.
8. The Workflow selects the first response received by the shared Message Broker and nominates that EventStore as the synchronisation Target.

9. The Workflow posts a message on the shared Message Broker Database in order to instruct the Source and Target EventStore Service Apps to populate the channel synchronisation panes with the appropriate properties (Figure 2-11). The EventStore Service Apps populate the Source system channel with the properties of the Target system channel, and the Target system channel with the properties of the Source system channel.

Note: The sync properties are entered into the BXF Synchronisation Pane that is accessible on the Channels > More Properties tab in the Configurator (Figure 2-11), as follows:

- **Session ID**
 - **Type**
 - **Role**
 - **Peer System Name**
 - **Peer Channel Name**
-

10. The Workflow ends.

N+1 Operation Phase2: System Association and Schedule Synchronisation

The system performs the following BXF messaging tasks in order to perform schedule synchronisation (Figure 2-3):

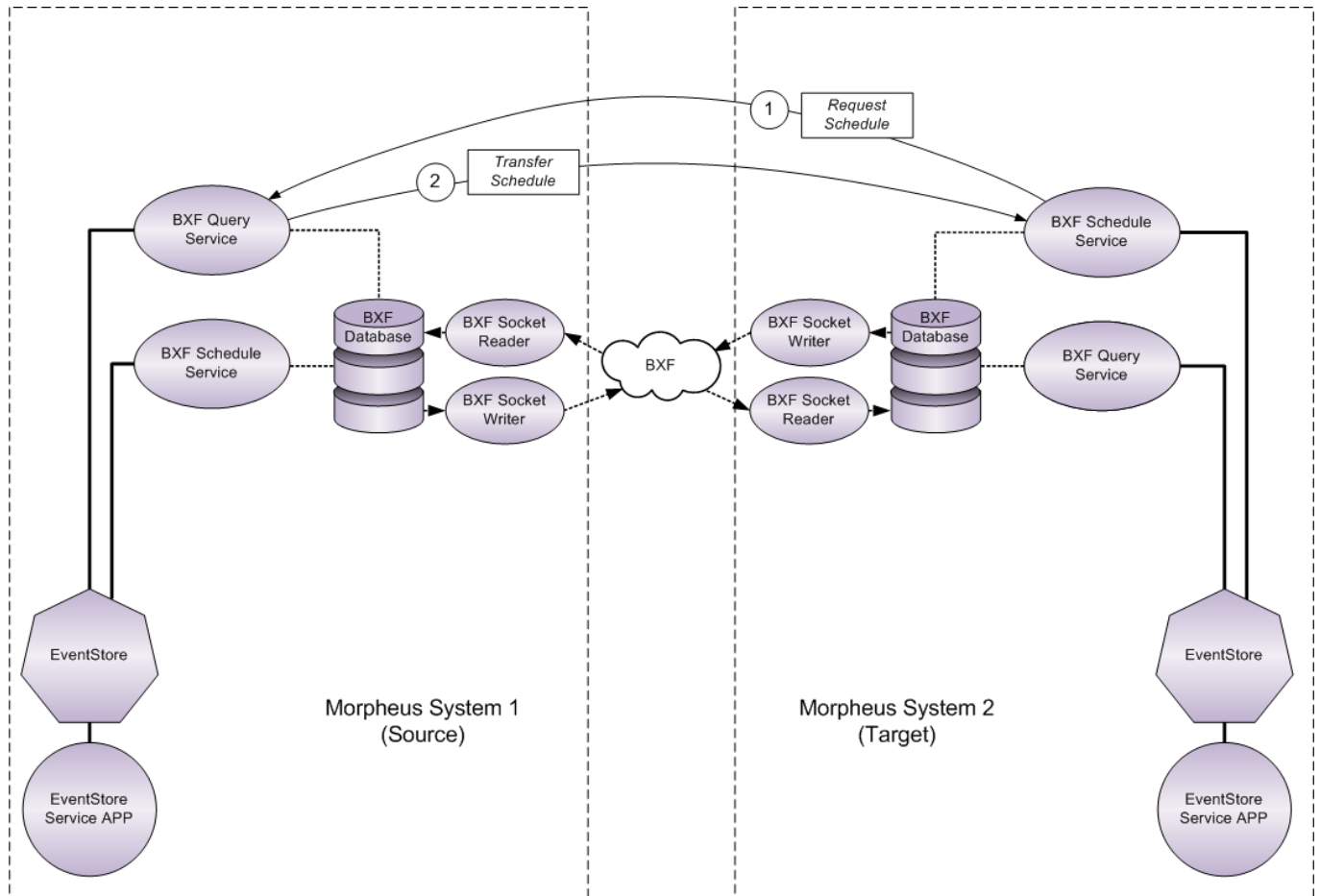


Fig. 2-3: N+1: BXF Synchronisation Process Messaging

Once the EventStore Service Apps have populated the channel(s) synchronisation pane(s) in the previous stage, the BXF Schedule Service on the Target system matches the Peer System Name to one of the destination systems configured on its Synchronisation tab, from which it can identify the agent name of the BXF Query Service on the Source Morpheus system.

Note: The destination system is identified as the Source

1. The BXF Schedule Service transmits a BXF Query Request message to the BXF Query Service on the Source system requesting the current schedule for the Peer Channel Name.
2. The BXF Query Service on the Source system responds by sending the requested schedule to the Target system in a BXF Query Response message.

The connection between the Source and the Target systems is then closed and there is no further message exchange.

Operation of Tertiary Synchronisation Mode

From a button press on the MIP of the Source channel (Figure 2-4), the BXF Tertiary mechanism performs an initial schedule transmission to the Target channel, and sends updates thereafter in order to maintain synchronisation between the two channels.

Note: The Source system is the on-air system.

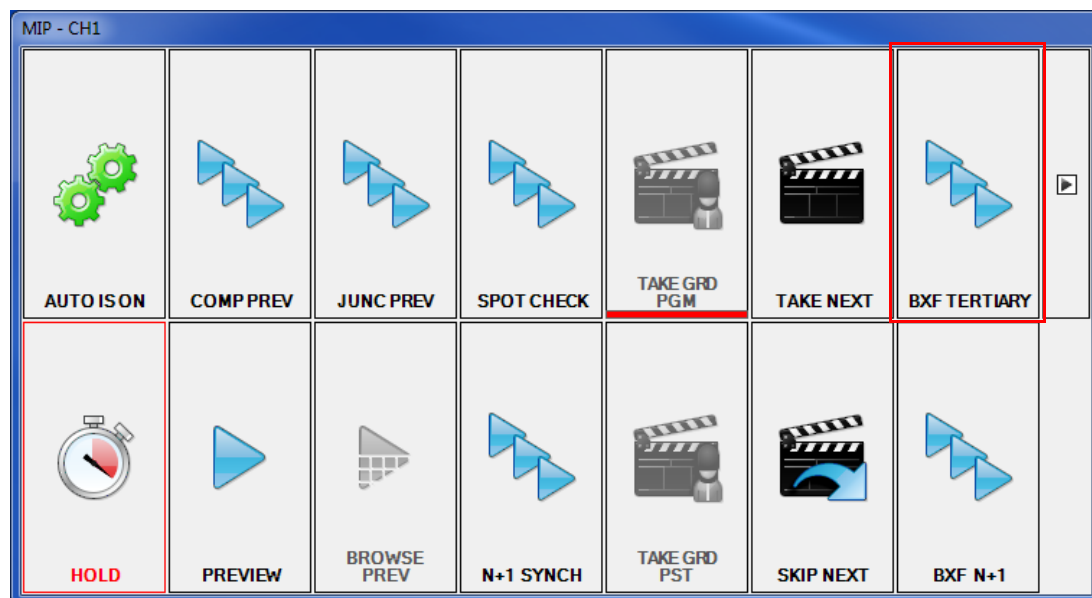


Fig. 2-4: Editor MIP BXF Tertiary Synchronisation

Note: Once the **BXF Tertiary** button has been pressed, and the synchronisation has been successful, it is replaced with a **Cancel** button, and the **BXF N+1** button is greyed out.

Tertiary Operation Phase1: Channel Discovery

The system performs the following tasks in order to initiate the channel synchronisation process (Figure 2-5):

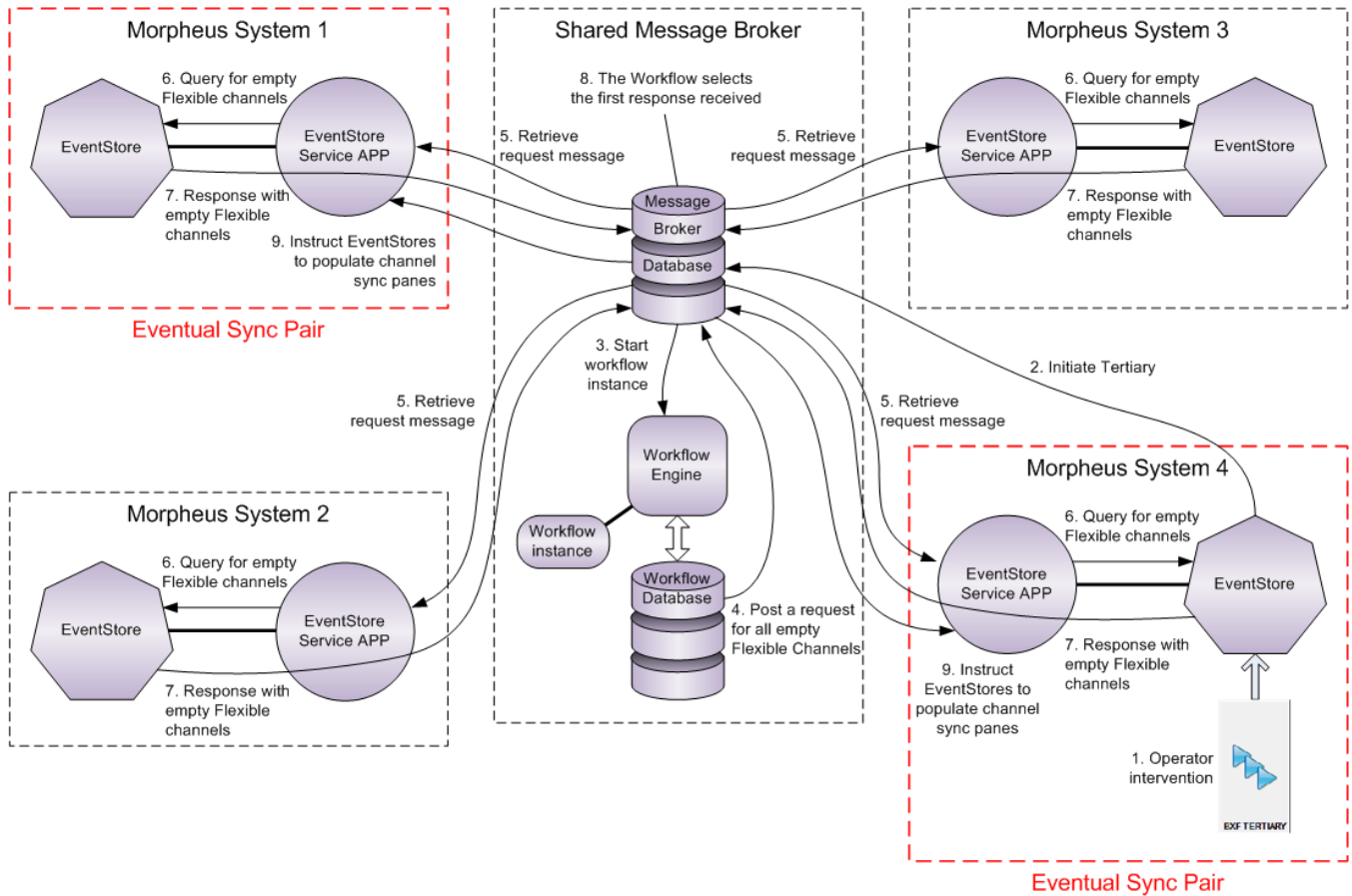


Fig. 2-5: Tertiary Flexible Channel Discovery

1. The operator selects **Tertiary** from the Manual Intervention Panel on the Source Morpheus system (in this example, synchronisation is initiated from Morpheus system number 4).
2. The local EventStore transmits a message to the shared Message Broker Database requesting that N+1 synchronisation is initiated.
3. The Message Broker sends a message to the Workflow Engine requesting that a Workflow is instantiated to coordinate the channel synchronisation process.
4. The Workflow Database posts a request onto the shared Message Broker Database for all subscribing EventStores to respond with their availability of empty Flexible channels.
5. Each EventStore Service App retrieves the message from the Message Broker Database.
6. Each EventStore Service App queries their local subscribing EventStores.
7. The EventStores respond with the available empty Flexible channels.
8. The Workflow selects the first response received by the shared Message Broker and nominates that EventStore as the synchronisation Target.

9. The Workflow posts a message on the shared Message Broker Database to instruct the Source and Target EventStore Service Apps to populate the channel synchronisation panes with the appropriate properties (BXF Synchronisation Mechanisms, Figure 2-11). The EventStore Service Apps populate the Source system channel with the properties of the Target system channel, and the Target system channel with the properties of the Source system channel.

Note: The sync properties are entered into the BXF Synchronisation Pane which is accessible on the Channels > More Properties tab in the Configurator (Figure 2-11), as follows:

- **Session ID**
 - **Type**
 - **Role**
 - **Peer System Name**
 - **Peer Channel Name**
-

10. The Workflow remains operational in order to perform the following tasks:
 - To terminate the synchronisation process if the **Cancel** button for this mode is pressed on the MIP panel
 - To restart the synchronisation process in the event of a Panoplay Leader / Follower changeover (the implication being that, in this mode, one Panoplay environment is synchronised to a single Morpheus system configured with flexible channels).

Tertiary Operation Phase2: System Association and Schedule Synchronisation

The system performs the following BXF messaging tasks in order to perform schedule and change synchronisation (Figure 2-6):

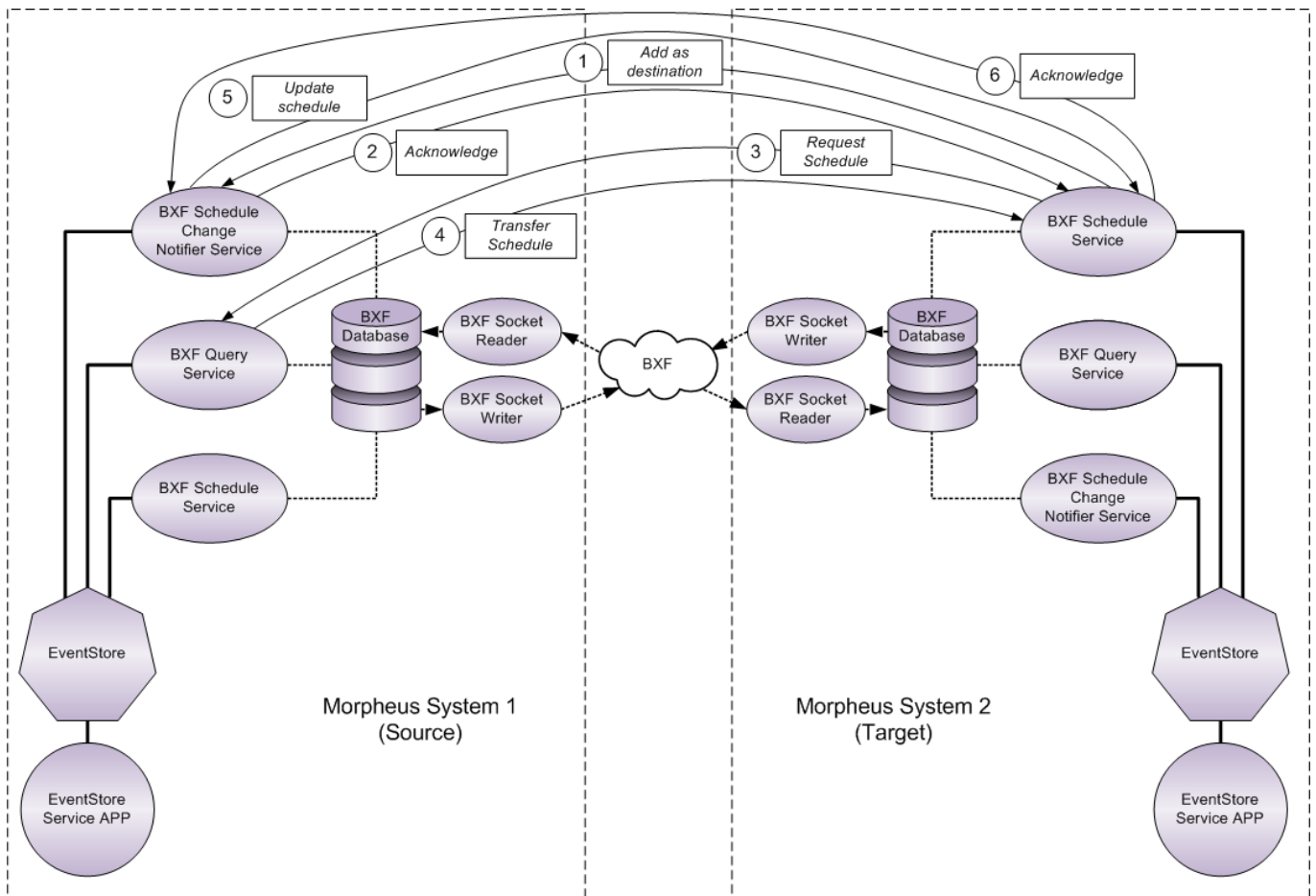


Fig. 2-6: Tertiary: BXF Synchronisation Process Messaging

Once the EventStore Service Apps have populated the channel(s) synchronisation pane(s) in the previous stage, the BXF Schedule Service on the Target system matches the Peer System Name to one of the destination systems configured on its Synchronisation tab, from which it can identify the agent name of the BXF Query Service on the Source Morpheus system.

1. The Target BXF Schedule Service transmits a message of type Configuration to the BXF Schedule Change Notifier on the Source system, requesting that it is added as a destination.
2. The Source BXF Schedule Change Notifier adds the BXF Schedule Service to its Destination tab and transmits an acknowledgement back to the Target BXF Schedule Service.

At this time the Source BXF Schedule Change Notifier Service is capable of sending updates to the Target BXF Schedule Service; they will however be ignored until the Target BXF Schedule Service has received a full current schedule from the Source BXF Query Service.

3. The Target BXF Schedule Service transmits a BXF Query Request message to the BXF Query on the Source system, requesting the current schedule for the Peer Channel Name.
4. The BXF Query Service on the Source system responds by sending the requested schedule once to the Target system in a BXF Query Response message. The schedule contains a Transaction ID.

Note: No further communication is required with the BXF Query Service, unless the synchronisation procedure is restarted.

5. Any subsequent change to the schedule on the Source is reported to the local BXF Schedule Change Notifier Service by the EventStore, and an unsolicited schedule update message is transmitted to the Target BXF Schedule Service.

For each schedule, the Target BXF Schedule Service compares the Transaction IDs of the received updates from the Source BXF Schedule Change Notifier Service against that of the complete original schedule received from the Source BXF Query Service earlier in the process. Only those updates that have a Transaction ID that is greater than that of the complete original schedule are applied.

Note: Schedule updates are buffered by the Source BXF Schedule Change Notifier Service and transmitted to the destination Target BXF Schedule Service at the interval (in seconds) specified as the value of Delay on Message Creation (Debounce) - for details, refer to the Morpheus Engineering Manual Supplement: BXF Service Configuration.

6. In response to a received schedule update from the Source system, the Target transmits an acknowledgement message in return.

Operation of MultiSite Sync Mode

MultiSite Sync performs the synchronisation of specified channels between a Source and a Target Morpheus Panoplay environment. It uses the following terminology:

- **Sync Group**

The name that associates the two sites to be synchronised.

Example: *GroupLondonBirmingham*

- **Sync Sites**

The two sites that are in the same Sync Group.

Example: *London, Birmingham*

- **Sync Set**

The name that is used to associate one or more channels to be synchronised between the two Sync Sites. There may be any number of Sync Sets, each having the capability of being synchronised independently of each other.

Note: Only a whole Sync Set can be synchronised (the synchronisation of a subset of the channels in the Sync Set is not supported) - this is Panoplay based behaviour.

Note: Channels that do not belong to a Sync Set can be used independently of MultiSite Sync.

For any channel in a sync set, it is recommended that the following Morpheus system configurations are identical on the Source and the Target systems:

- Channel properties
- Event properties
- Device properties

Note: Some property variations can be accommodated between Morpheus Panoplay systems - this will require consultation with the software developers.

Using the MultiSite Control User Interface

The MultiSite Control User Interface is a software component that provides manual control functions for each Panoplay Sync Set configured for MultiSite Sync, as follows:

- Selection of synchronisation direction
- Start / stop of sync sets by communicating with the Message Broker to change the state of the Workflow

When first started, only the **Start Controller** and **Stop Controller** buttons are visible on the interface. An example of an operational MultiSite Control User Interface is shown in Figure 2-7. The interface provides control functions for each Panoplay Sync Set configured into the BXF Sync Group, unless otherwise hidden with a Sync Set Filter (for details on filtering, refer to MultiSite Sync: Configure the MultiSite Control Application).

Note: The MultiSite Control User Interface only communicates with the Panoplay Leader on each site.

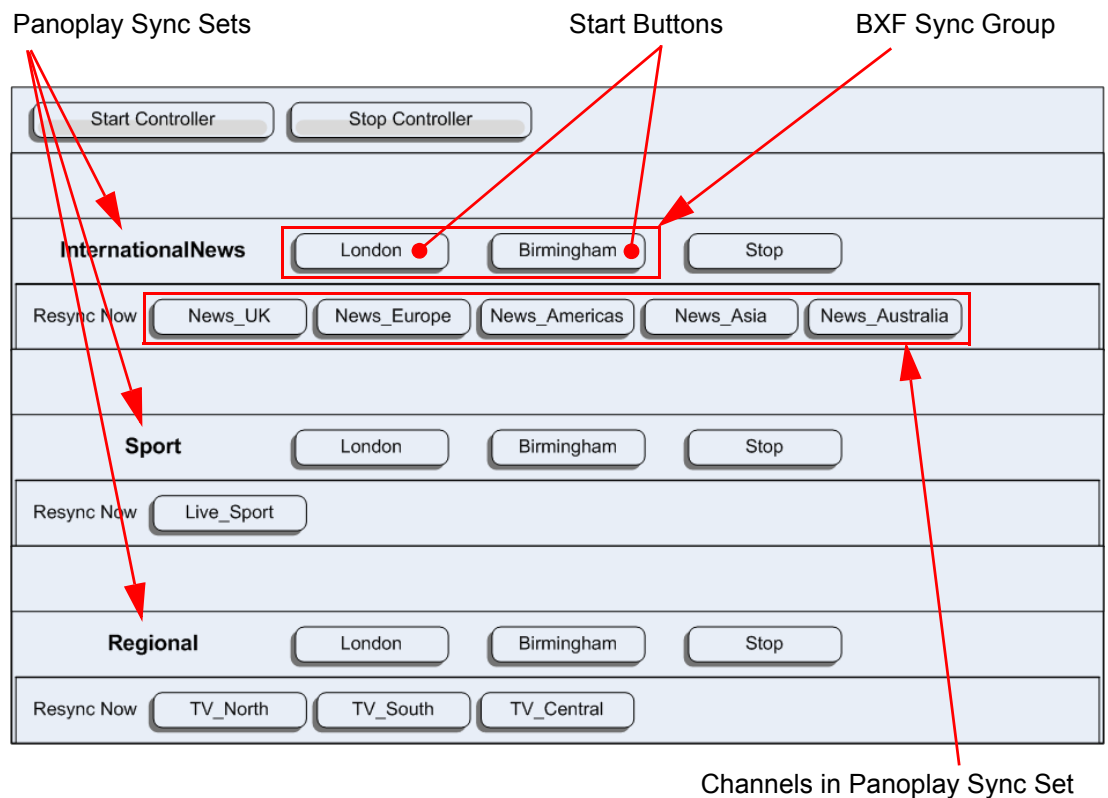


Fig. 2-7: MultiSite Control User Interface

- Start Controller / Stop Controller

Start up and shut down the MultiSite Controller. When stopped, the **Stop Controller** button is greyed out, and vice-versa. If the MultiSite Controller is stopped, then the user interface will close down but the Workflow will maintain the synchronisation.

- BXF Sync Group Start / Stop Buttons

Each Panoplay Sync Set, within the BXF Sync Group, features two start buttons and a stop button - this allows the BXF synchronisation of each Panoplay Sync Set to be started and stopped independently of another.

The start buttons for each Panoplay Sync Set are labelled according to the BXF Sync Sites entered into the Panoplay configuration XML. To select the Source system and start the Workflow for the BXF synchronisation of a Panoplay Sync Set, click on a Sync Site **Start** button (e.g. in order to start the BXF Synchronisation of a particular Panoplay Sync Set with London as the Source system, then click on the start button labelled London).

Either system may be selected as the Source for different Panoplay Sync Sets configured into the same BXF Sync Group.

Use the **Stop** button to end the BXF Synchronisation of a Panoplay Sync Set.

Note: It is not possible to change the Source system once a sync set is active - the start buttons are greyed out to prevent such a change. In order to swap the Source and Target roles, the sync set must be stopped and then restarted.

- Resync Now

Each channel within a Panoplay Sync Set has a dedicated button. Once the Sync Set is running, the channel buttons become highlighted in order to indicate that they are enabled - press a channel button in order to restart the BXF Synchronisation of the channel independently of any others in the Sync Set. Channel resynchronisation is executed using the BXF protocol only, therefore no Workflow intervention is required.

MultiSite Sync Operation Phase 1: Discover Panoplay Leaders

Note: All communication between applications uses the Message Broker as an intermediary.

1. The BXF synchronisation process begins by clicking on the **Start Controller** button in the MultiSite Control User Interface (Figure 2-8).

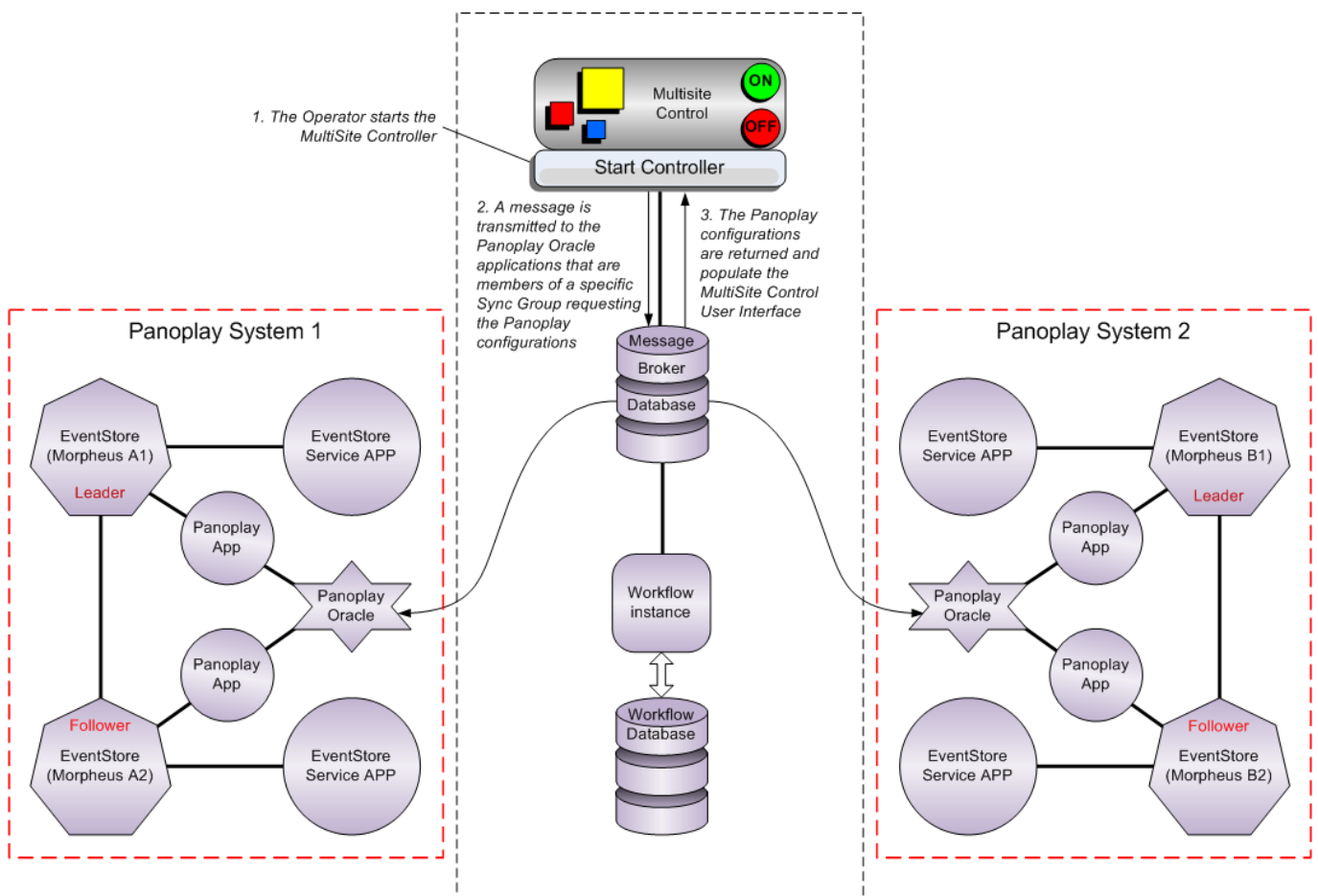


Fig. 2-8: BXF MultiSite Sync Mode: Discover Panoplay Configurations

2. The MultiSite Control User Interface transmits a message to the Message Broker, destined for the Oracle applications in order to determine the Panoplay configurations of the systems that are configured into a specified Sync Group.
3. The Oracle Applications transmit messages back to the MultiSite Control User Interface containing their local Panoplay configurations.

If the configurations are identical, the MultiSite Controller User Interface fields and buttons will be populated with the received properties, otherwise the synchronisation process will be terminated.

MultiSite Sync Operation Phase2: Source / Target Status Allocation

Note: All communication between applications use the Message Broker as an intermediary.

1. From the MultiSite Control User Interface, the Operator selects the sync Source system and clicks on the appropriate button.

Note: This is the only manner in which the Source can be set. Furthermore, there is no monitoring of the Source / Target Status, and no automated switchover.

2. A message is transmitted to the Workflow containing the names of the Sync Sets and the member channels that relate to the selected Source.

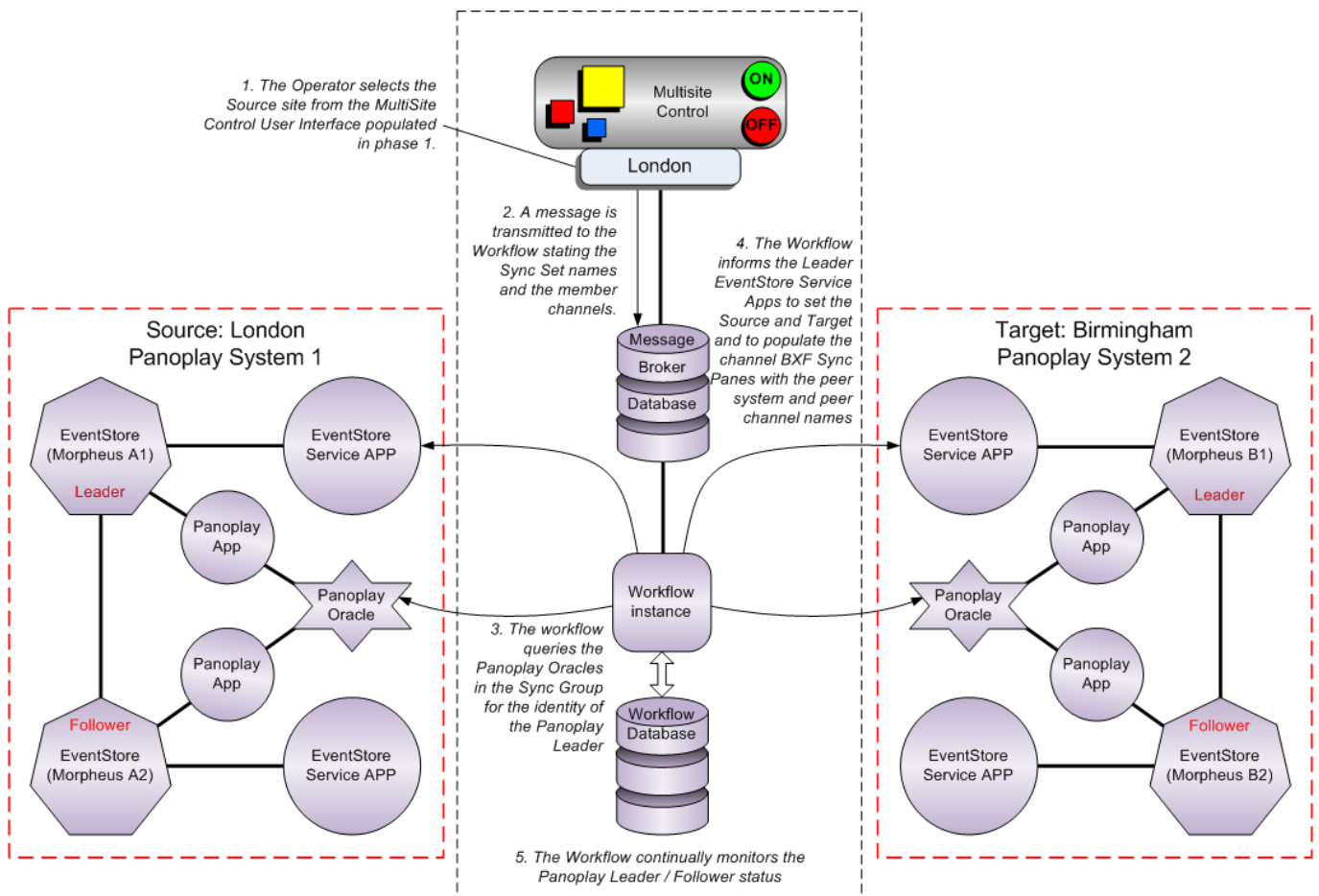


Fig. 2-9: MultiSite Sync Mode: Source / Target Status Allocation

3. A Workflow instance is instantiated for each Sync Set that will communicate with both of the Panoplay Oracle applications that responded in phase 1 - the identity of the local Panoplay Leaders are requested.

Note: Workflow instances are created dynamically by the Workflow Engine upon the receipt of a message from the Message Broker - all Workflow instances are created from the BxfMultiSitePanoplaySync Workflow template, one of each will run for each sync set.

4. The same Workflow instances send messages to the Leader EventStore Service Apps to set the Morpheus systems as either sync Source (as selected by the Operator in the MultiSite Control User Interface) or sync Target, and to populate the BXF Synchronisation panes of the channels in the Sync Set with their peer system and peer channel names.

Note: Sources and Targets are defined per Sync Set, therefore the Source for one Sync Set may be the Target for another.

Note: The BXF Synchronisation pane is accessible on the Channels > More Properties tab in the Configurator (Figure 2-11)

5. The Workflow instances monitor the status of both the Panoplay Leader and Follower.

MultiSite Sync Operation Phase3: Schedule Synchronisation over BXF

Prior to the synchronisation of the schedule, the EventStores inform their local BXF Schedule Services of the channels to synchronise based upon the properties entered into the channel BXF Synchronisation panes. The BXF Schedule Service on the Target system matches the Peer System Name to one of the destination systems configured on its Synchronisation tab, from which it can identify the agent name of the BXF Query Service on the Source.

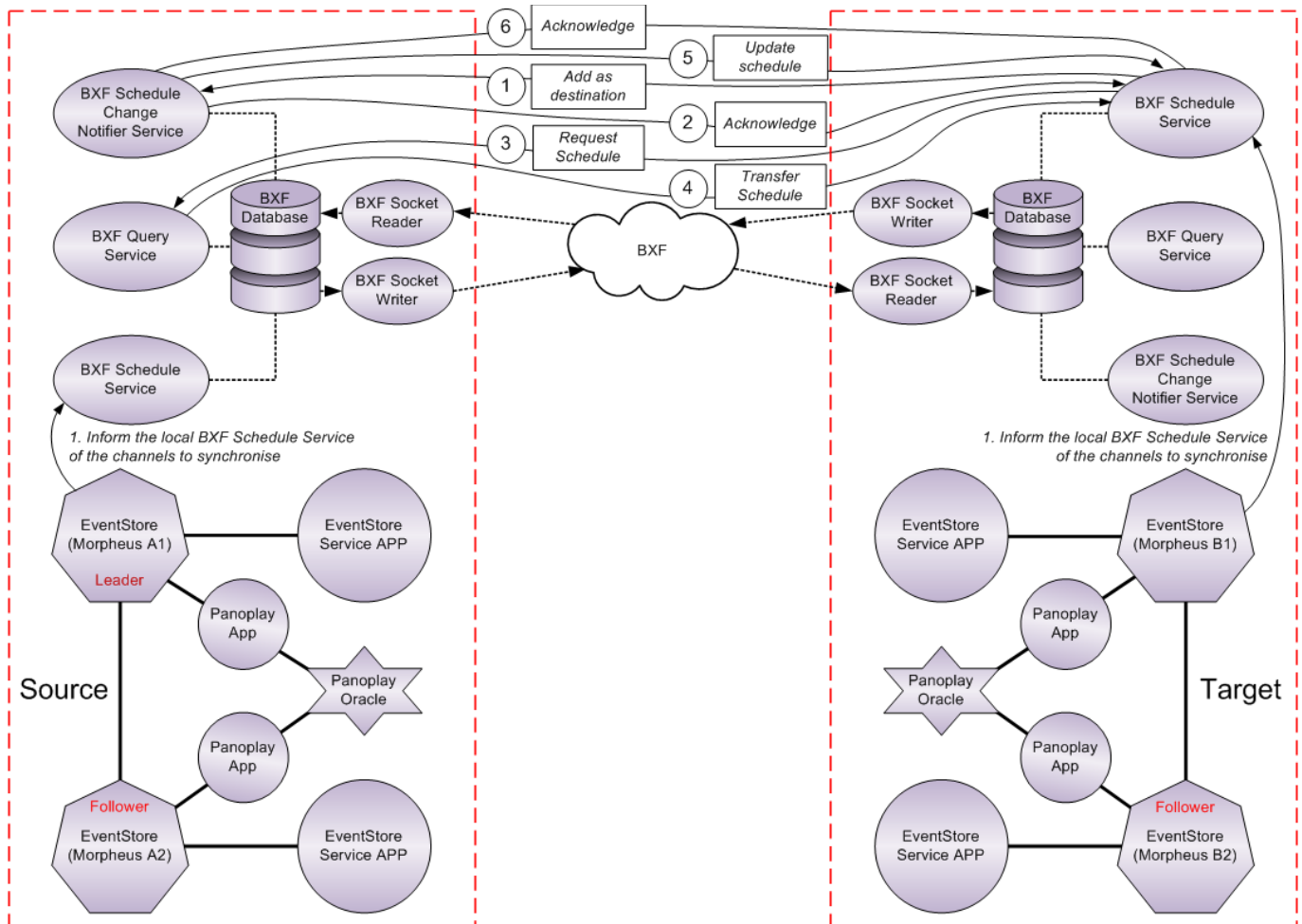


Fig. 2-10: MultiSite Sync: Schedule Synchronisation over BXF

The subsequent stages of the process are identical to phase 2 of the Tertiary mode, as follows:

1. The BXF Schedule Service transmits a message of type Configuration to the BXF Schedule Change Notifier on the Source system, requesting that it is added as a destination.

Note: For the BXF Schedule Service to withdraw from the sync partnership, it sends a Deconfigure message to the BXF Schedule Change Notifier Service requesting that it be removed as a destination.

2. The BXF Schedule Change Notifier Service on the Source system adds the BXF Schedule Service to its Destination tab and transmits an acknowledgement back to the BXF Schedule Service.

The Source BXF Schedule Change Notifier Service is now capable of sending updates to the Target BXF Schedule Service; they will however be ignored until the Target BXF Schedule Service has received a full current schedule from the BXF Query Service.

IMPORTANT: When using MultiSite Sync, the destination fields in the BXF Schedule Change Notifier must not be populated manually.

3. The Target BXF Schedule Service transmits a BXF Query Request message to the BXF Query Service on the Source system, requesting the current schedule for the configured Peer Channel Name.
4. The BXF Query Service on the Source system responds by sending the requested schedule to the Target system in a BXF Query Response message. The schedule contains a Transaction ID.

Note: No further communication is required with the BXF Query Service hereafter, unless the synchronisation procedure is restarted.

5. Any subsequent change to the schedule on the Source is reported to the local BXF Schedule Change Notifier Service by the EventStore, and an unsolicited schedule update message is transmitted to the BXF Schedule Service on the Target.

For each schedule, the BXF Schedule Service compares the Transaction IDs of the received updates from the BXF Schedule Change Notifier Service against that of the complete original schedule received from the BXF Query Service earlier in the process. Only those updates that have a Transaction ID that is greater than that of the complete original schedule are applied.

Note: Schedule updates are buffered by the Source BXF Schedule Change Notifier Service and transmitted to the destination Target BXF Schedule Service at the interval (in seconds) specified as the value of Delay on Message Creation (Debounce) - for details, refer to the Morpheus Engineering Manual Supplement: BXF Service Configuration.

6. In response to a received schedule update from the Source system, the Target returns an acknowledgement message.

Note: The Workflow establishes if the Source changes and adjusts the synchronisation as required.

Note: In order to prevent any changes to the Target Morpheus system schedule, the system locks the Editor Workstation - it can be unlocked in the event of a failure of the Source Morpheus system using either of the following procedures:

- In the Configurator, on the More Properties tab for a channel, release the channel from the MultiSite Sync Set by clicking on the **Release BXF Sync** button. For details, refer to Figure 2-11 in the BXF Synchronisation Configurations section.
- In the MultiSite Control User Interface, release a Sync Set by clicking on the **Stop** button. For details, refer to Using the MultiSite Control User Interface.

CAUTION: synchronisation will be affected if either of these procedures are employed.

As the Workflow instances are actively monitoring the status of the Panoplay Leader and Follower, in the event of a change the synchronisation is stopped, the BXF Synchronisation panes of the channels in the Sync Set are populated with new peer system and peer channel names, and phase 3 (Schedule Synchronisation Over BXF, this phase) is executed once again.

BXF Synchronisation Configurations

Details on the configuration of services and interfaces for all synchronisation modes.

In order to enable any synchronisation capabilities, all participating Morpheus systems must be identified within each system's BXF configuration, and the required set of host shell / BXF services assembled and duplicated across each environment.

The BXF Synchronisation Pane

The properties in the BXF Synchronisation pane (Figure 2-11) are assigned values by the EventStore Service Apps for each channel configured to be synchronised, regardless of the selected mode.

WARNING: Although the assigned values can be manually edited, they must not be modified in this manner.

Open the Configurator, select a channel and click on the More Properties tab.

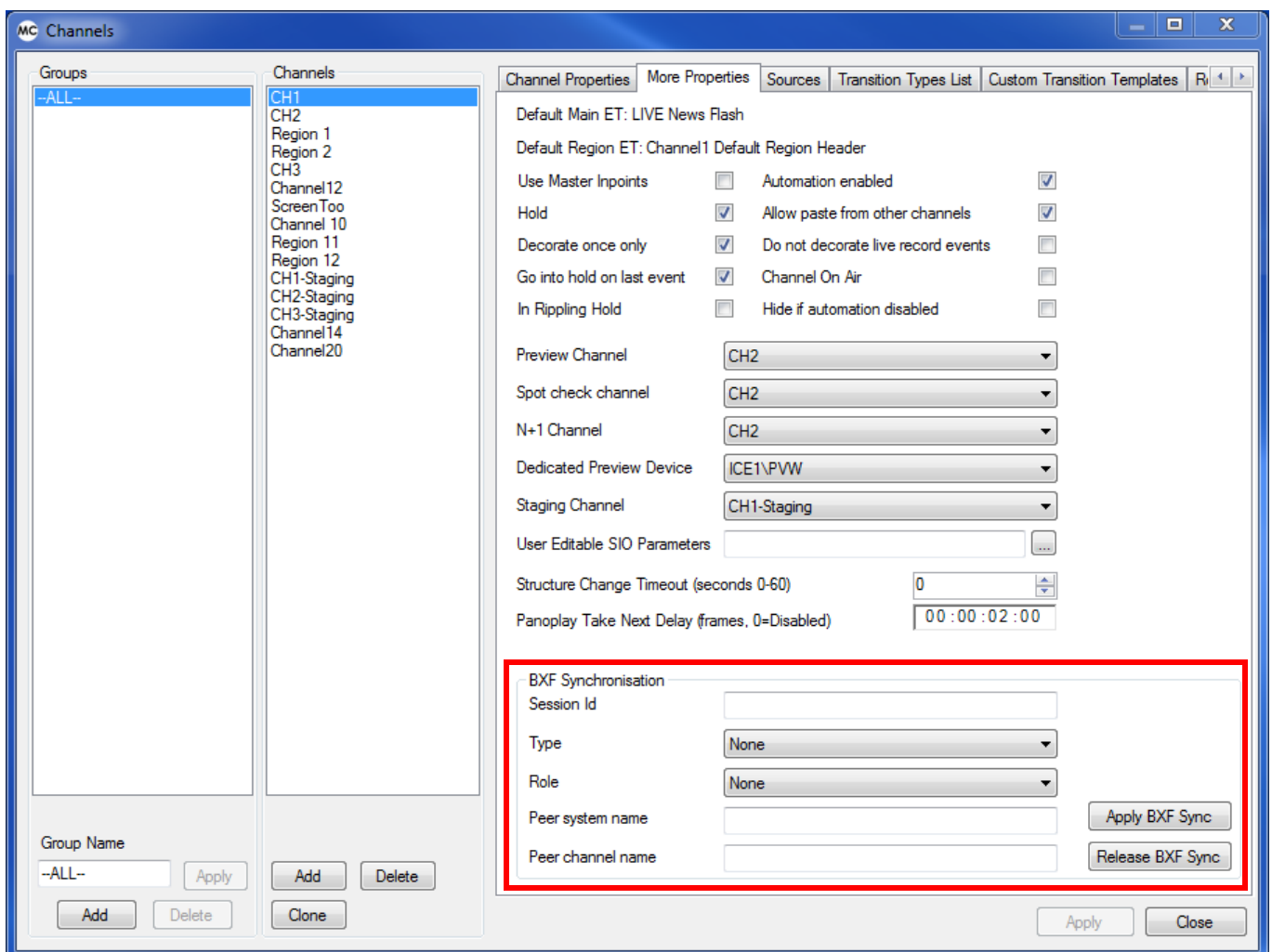


Fig. 2-11: Configurator - Channel > More Properties Tab

- Session ID

A single GUID generated by the Workflow and allocated to both the Source and Target systems.

- Type

The configured BXF Synchronisation type is displayed:

- **None**
BXF Synchronisation is not configured for this channel
- **NPlusOne**
- **Tertiary**

Note: When using MultiSite Sync, the Type field will be labelled as Tertiary.

For information relating to the different BXF Synchronisation modes, refer to the following sections in this document:

- Operation of N+1 Synchronisation Mode
- Operation of Tertiary Synchronisation Mode
- Operation of MultiSite Sync Mode

- Role

For all modes of BXF Synchronisation, this field indicates whether the channel is the Source or the Target.

The role is assigned on a per channel basis, therefore different channels on the same system may have different roles. Prior to the deployment of a system, a customer specific Workflow is designed that will define the rules for the allocation of roles, and whether they are based upon channels, Sync Sets, or other criteria.

- Peer System Name

The system name of the partner in this BXF Synchronisation configuration (e.g. if the system currently in view is the Source, then the system name of the Target is displayed).

- Peer Channel Name

The name of the channel on the Peer system with which this channel is synchronised.

- Apply BXF Sync

Start the synchronisation of the selected channel.

Note: This button is reserved for engineering purposes only.

Note: The Workflow will populate the BXF Synchronisation pane with values for both the Source and Target systems, the **Apply BXF Sync** function should be executed on both the Source and the Target system in order to ensure that the entries on the BXF Synchronisation panes are written to both EventStores.

- Release BXF Sync

Effective for Tertiary and MultiSite Sync only.

Stop the synchronisation of the selected channel.

Note: This button is reserved for engineering purposes only.

Note: The Workflow will populate the BXF Synchronisation pane with values for both the Source and Target systems, the **Release BXF Sync** function should be executed on both the Source and the Target system in order to ensure that the entries on the BXF Synchronisation panes are removed from both EventStores.

N+1 Configuration

N+1: Configure the Editor MIP Panel

A button on the MIP panel is used to activate N+1 synchronisation. It is hidden by default, and the Editor must be configured for it to be displayed, as follows:

Note: The MIP panel is configured on a per channel basis. Repeat this procedure for all channels from which N+1 Synchronisation is to be triggered.

1. In the Editor, click on **Tools** then select **Configuration** from the drop-down menu.
2. Select the channel to configure from the displayed list, and click on the **MIP** tab. The Editor Configuration window is displayed (Figure 2-12):

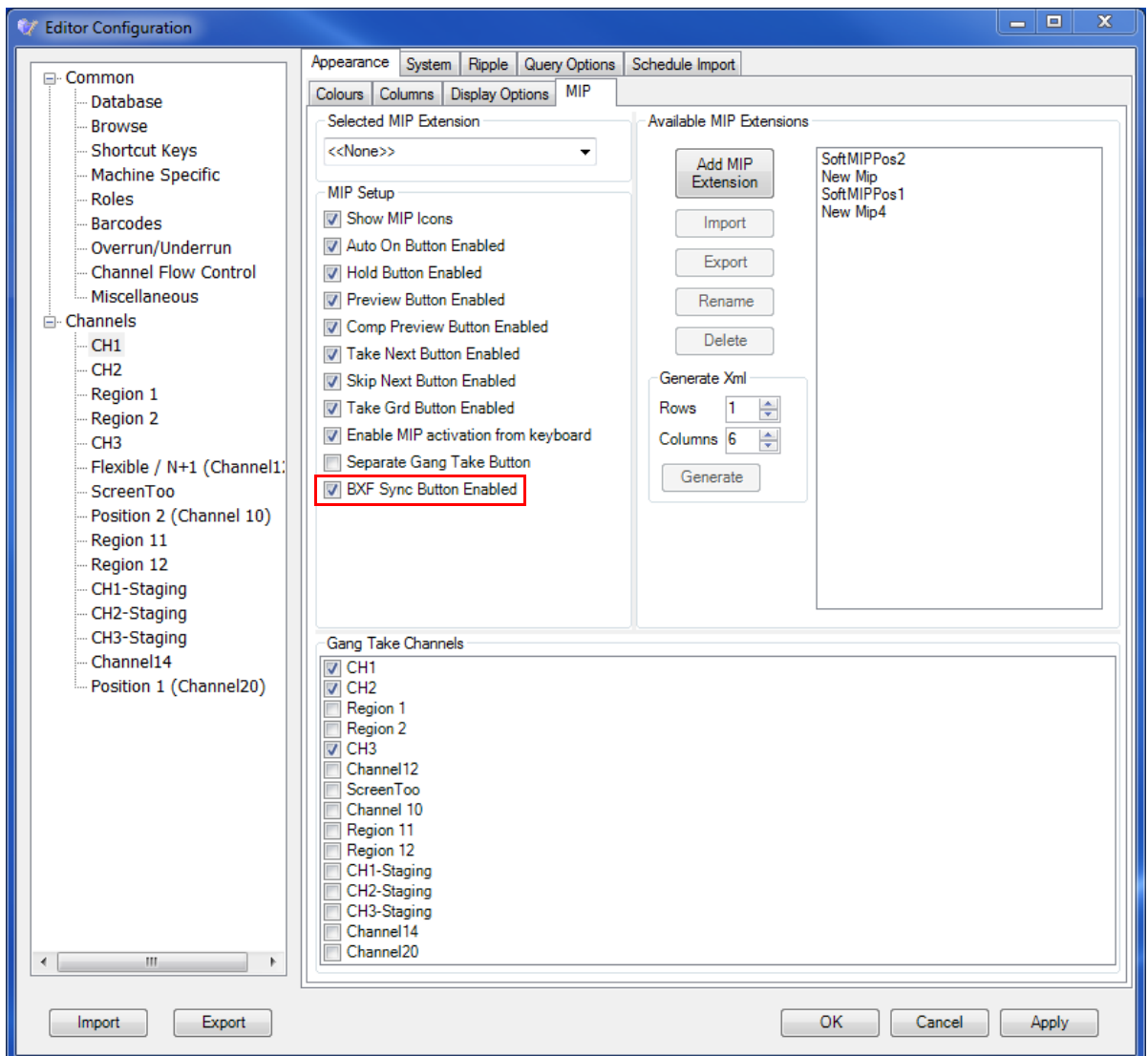


Fig. 2-12: Configuring the MIP to Display the BXF Sync Buttons

3. Tick the **BXF Sync Button Enabled** checkbox, and click on **Apply**.

When the MIP is opened from the Editor, both the BXF Tertiary and the BXF N+1 buttons will now be visible (Figure 2-13).

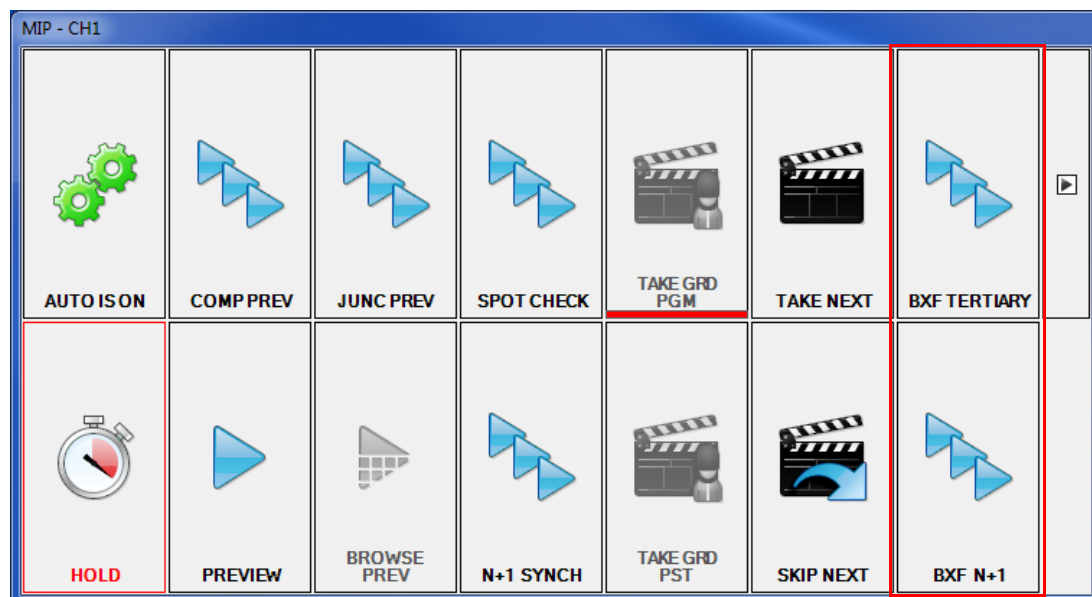


Fig. 2-13: Editor MIP BXF Sync Buttons

It is acceptable to run either synchronisation mechanism on one or more different channels concurrently.

For configuration and operational information, refer to the sections that detail the individual modes.

N+1: Configure the Message Broker Database

The N+1 mode requires the configuration of a Message Broker Database - it is a commissioning task and is therefore beyond the scope of this document.

The Message Broker Database has the following characteristics:

- Receipt, storage and retrieval of messages.
- It features a Message Broker for the exchange of messages for communication between software components (a mailbox is dedicated to each software component). Software component communication behaviour is based upon publishers, subscribers, and one-to-one direct messaging.

N+1: Configure the BXF Database

The N+1 mode requires the configuration of a BXF database - it is a commissioning task and is therefore beyond the scope of this document.

The BXF Database has the following characteristics:

- The storage of BXF messages, pending processing by the appropriate destination BXF service.

N+1: Configure the Workflow Engine

The Workflow orchestrates communication between the system components that are responsible for linking the channels for the purpose of synchronisation.

The Workflow Engine App is started from the Morpheus Shortcuts window. It relies upon a dedicated Workflow Database, the creation of which is a commissioning exercise, and is therefore beyond the scope of this document.

Note: Only one Workflow Engine is required for the N+1 synchronisation setup.

1. Click on **Application** and from the drop-down menu select **Settings**. The Workflow Engine App Settings window is displayed (Figure 2-14).

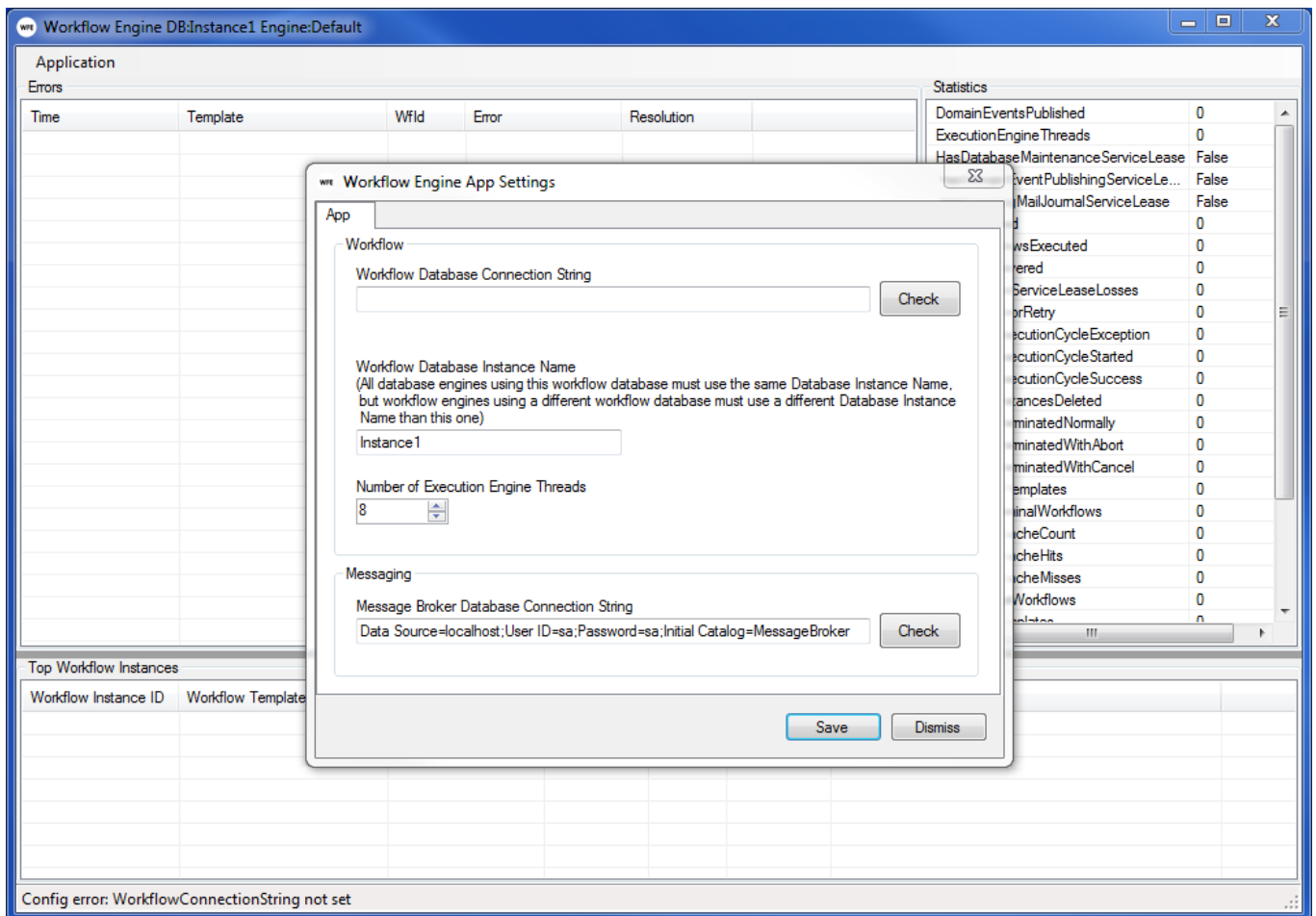


Fig. 2-14: Configuring the Workflow Engine App Settings

- Workflow Database Connection String

Enter the connection string that will provide access to the Workflow database. The properties for this string will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Workflow Database Instance Name

The unique name of this Workflow Database that identifies it to the Message Broker. All Workflow Engines using this database must be configured with a unique instance name.

Note: The Workflow Database Instance name field is automatically populated by the system when the Workflow Database Connection String **Check** button is pressed with a valid connection string.

- Number of Engine Execution Threads

A performance tuning parameter that will be configured automatically to the number of processors in the host system.

- Message Broker Database Connection String

The Deploy tool will have set the connection string to that configured on the Message Broker tab of the Deploy tool - it must be changed to the connection string of the Message Broker that is part of the Control System, the properties of which will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Save

Save any changes.

- Dismiss

Close the window.

2. Load the Workflow template into the Workflow Engine
 - a) In the Workflow Engine application window, click on **Application** then select **Templates** from the drop-down menu. The Workflow Templates window is displayed (Figure 2-15).

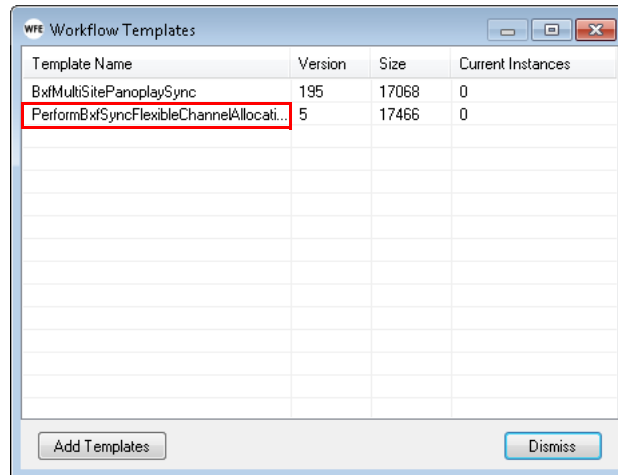


Fig. 2-15: Workflow Templates Window

The BXF synchronisation Workflow requires the following template file to be loaded into the Workflow engine:

PerformBxfSyncFlexibleChannelAllocationWF.wft

- b) Click on **Add Templates** and browse to the location of the required workflow template - it can be found in the Deploy folder.
- c) Click on **Dismiss** to finish.

3. Load the Workflow Initiators into the Workflow Engine. The role of the Workflow initiator is to launch the *PerformBxfSyncFlexibleChannelAllocation* Workflow once the BXF Sync process is started from the MIP panel.
 - a) From the Workflow Engine application window, click on **Application** then select **Initiators** from the drop-down menu. The Workflow Initiators window is displayed (Figure 2-16).

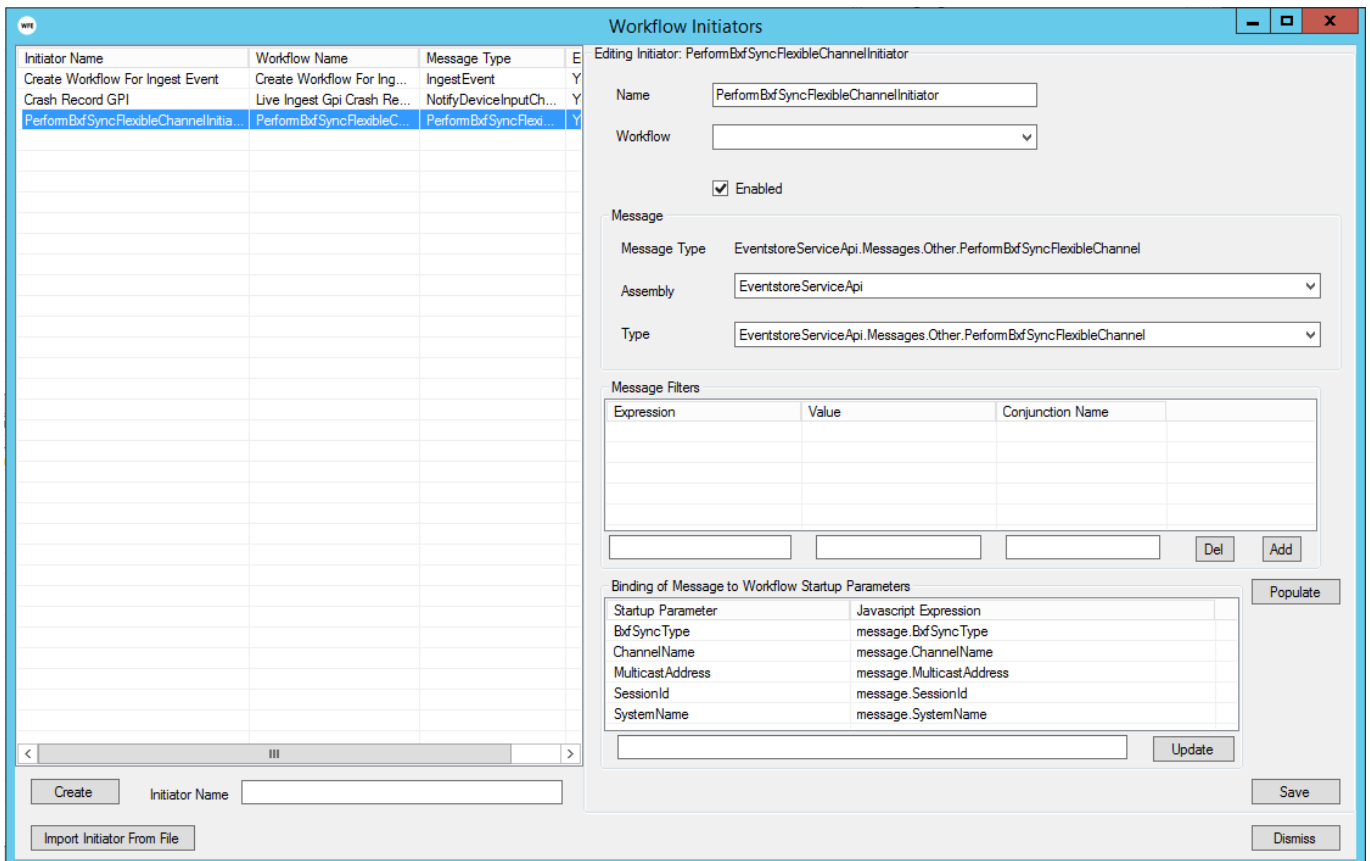


Fig. 2-16: Workflow Initiators Window

The PerformBxfSyncFlexibleChannelAllocation Workflow requires the following initiator file to be loaded into the Workflow engine:

PerformBxfSyncFlexibleChannelInitiator.wfi

- b) Click on **Import Initiator From File** and browse to the location of the required Workflow file - it can be found in the Deploy folder

The file will be loaded into the Workflow Engine and appears in the list of initiators. Click on the initiator in the list in order to view its properties. The initiator is configured with the name of the required Workflow template which will be displayed as the *Workflow* property (Figure 2-16).

Note: Other than those mentioned herein, the properties of an initiator should not be modified - any such task is reserved for engineering.

- c) Ensure that the **Enabled** checkbox is ticked, click on **Save**, then click on **Dismiss** in order to close the window.

N+1: Configure the Morpheus Services

The following Morpheus Services are required to be configured for each participating system in order that they may fulfill the role of either Source or Target if elected to do so:

- **EventStore Service App**

The EventStore Service App is responsible for the following synchronisation tasks:

- Receive messages through the Message Broker (from other systems and processes) that are destined for the local Event Store during the execution of the Workflow.
- Process requests from the local Event Store destined for the Message Broker during the execution of the Workflow.

A dedicated instance of the EventStore Service App must be created and configured for each Morpheus system participating in the selected sync mode. No other configuration of this service is necessary, apart from the change to the Message Broker connection string. The procedure follows.

The Deploy tool will have configured the EventStore Service App with the default Message Broker connection string - it must be changed in order to reference the Message Broker Database that is dedicated to the sync process.

1. Right click on the EventStore Service App shortcut and select **Properties** from the displayed menu.

The EventStore Service App Properties window is displayed (Figure 2-17).

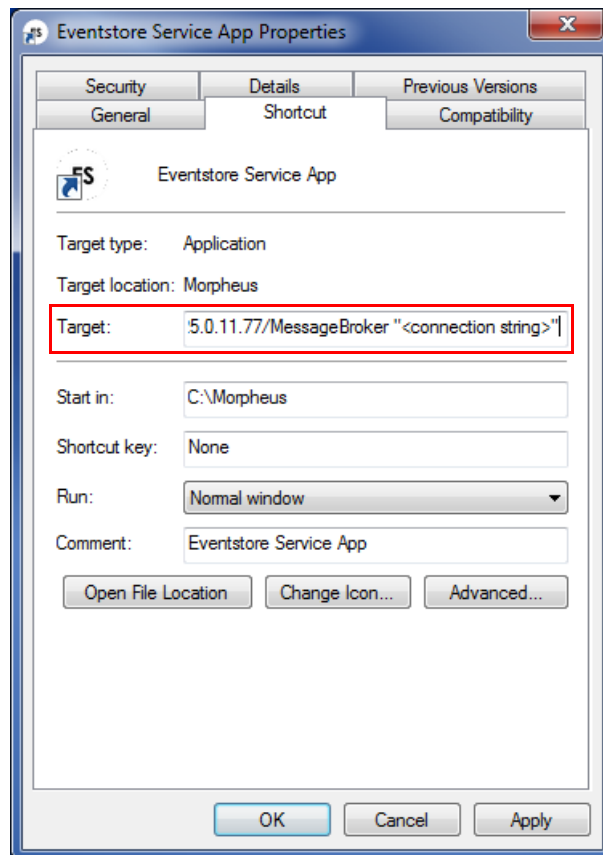


Fig. 2-17: Changing the Default Connection String

2. Append the Target field entry with the following qualifier:
/MessageBroker "<connection string>"

Where <connection string> takes the following format (example shown):

```
Data Source=<IP address>;User ID=sa;Password=sa;Initial Catalog=MessageBroker
```

N+1: Configure the BXF Services

The BXF Services that are required for N+1 Synchronisation.

Note: All BXF service configurations are detailed in the Morpheus Engineering Supplement: BXF Service Configuration.

- **BXF Schedule Service**

- A Host Shell service that runs on the Target system in order to send and receive BXF messages as part of the schedule synchronisation process during the startup procedure.

- Clears the Target system channel(s) and applies the schedule(s) received from the Source system.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Query Service**

- A BXF standards based Host Shell service that runs on the Source system during the startup procedure.

- Receives and processes BXF Query Messages containing channel information requests.

Note: As a passive service, it only responds to message requests.

This service does not require the intervention of a Message Broker in order to communicate.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Socket Writer Service**

An individual Host Shell service instance that provides a BXF communication path for the exchange of schedule information. It queries the BXF database for messages with destination services that it is configured for, transmitting them via an IP socket.

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

- **BXF Socket Reader**

The BXF Socket Reader Service reads BXF messages that have been transmitted from one or more BXF Socket Writer services (or equivalent services from a third party external system).

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

Tertiary Configuration

Tertiary: Configure the Editor MIP Panel

A button on the MIP panel is used to activate Tertiary synchronisation. It is hidden by default - the Editor must be configured for it to be displayed, as follows:

Note: The MIP panel is configured on a per channel basis. Repeat this procedure for all channels from which Tertiary Synchronisation is to be triggered.

1. In the Editor, click on **Tools** then select **Configuration** from the drop-down menu. The Editor Configuration window is displayed (Figure 2-18).
2. Select the channel to configure from the displayed list, and click on the **MIP** tab.

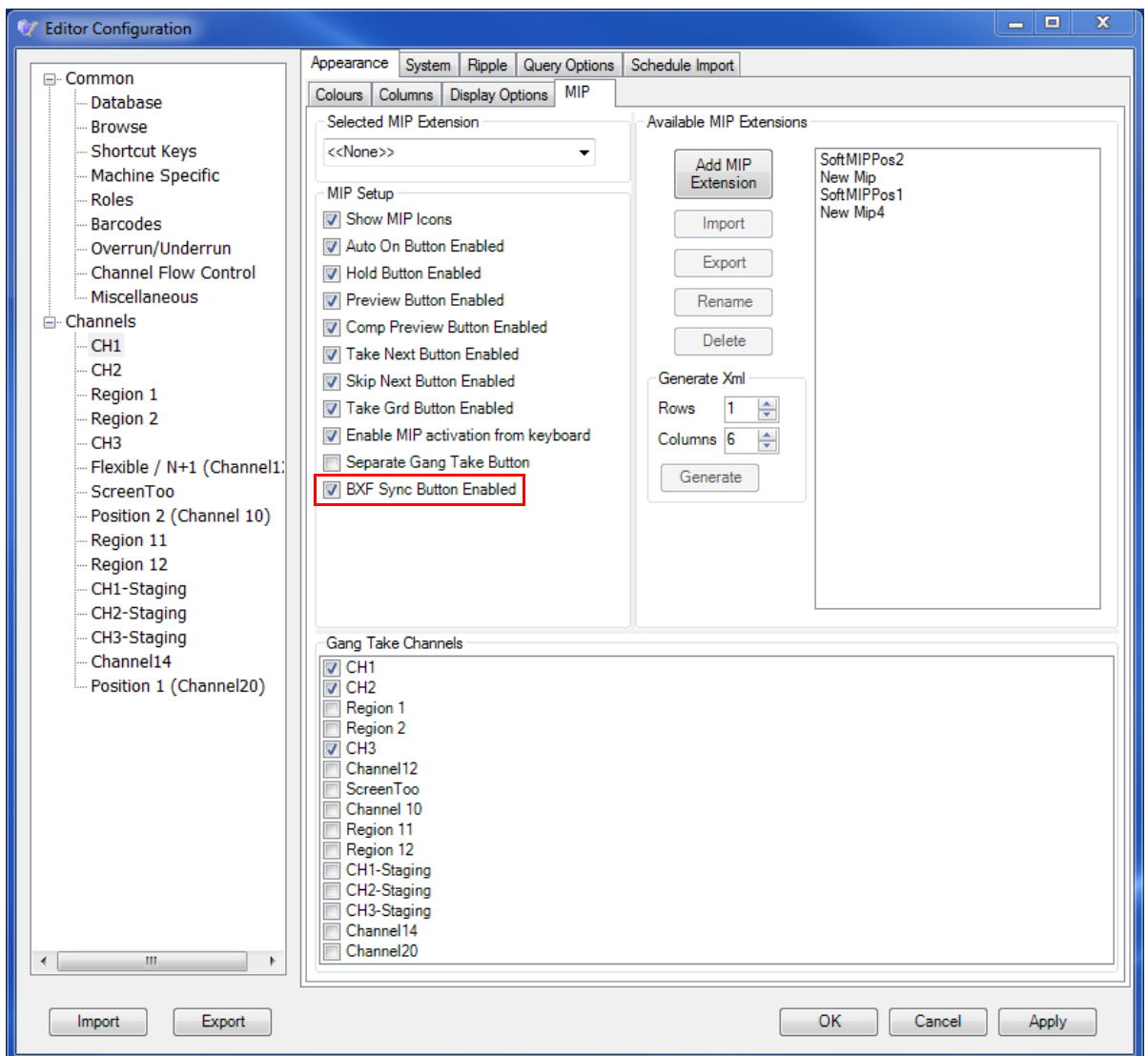


Fig. 2-18: Configuring the MIP to Display the BFX Sync Buttons

3. Tick the **BFX Sync Button Enabled** checkbox, and click on **Apply**.

When the MIP is opened from the Editor, both the BXF Tertiary and the BXF N+1 buttons will now be visible (Figure 2-19).

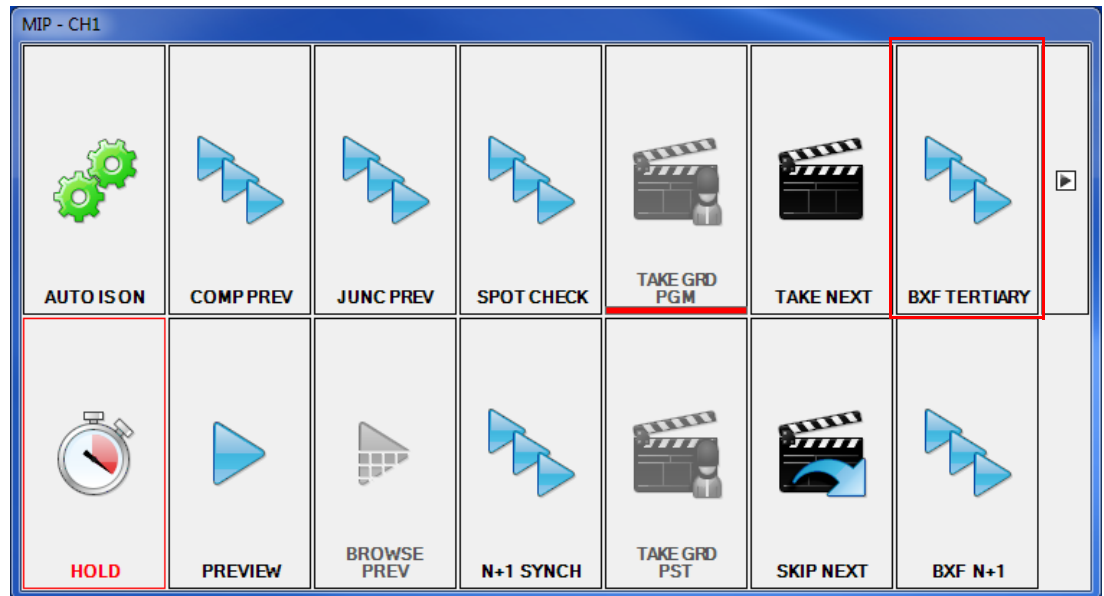


Fig. 2-19: Editor MIP BXF Sync Buttons

It is acceptable to run either synchronisation mechanism on one or more different channels concurrently.

For configuration and operational information, refer to the sections detailing the individual modes that can be found later in this document.

Tertiary: Configure the Message Broker Database

The Tertiary mode requires the configuration of a Message Broker Database - it is a commissioning task and therefore beyond the scope of this document.

The Message Broker Database has the following characteristics:

- Receipt, storage and retrieval of messages.
- It features a Message Broker for the exchange of messages for communication between software components (a mailbox is dedicated to each software component). Software component communication behaviour is based upon publishers, subscribers, and one-to-one direct messaging.

Tertiary: Configure the BXF Database

The Tertiary mode requires the configuration of a BXF database - it is a commissioning task and therefore beyond the scope of this document.

The BXF Database has the following characteristics:

- The storage of BXF messages, pending processing by the destination BXF service.

Tertiary: Configure the Workflow Engine

The Workflow orchestrates communication between the system components that are responsible for linking the channels for the purpose of synchronisation.

The Workflow Engine App is started from the Morpheus Shortcuts window. It relies upon a dedicated Workflow Database, the creation of which is a commissioning exercise, and is therefore beyond the scope of this document.

Note: Only one Workflow Engine is required for the Tertiary synchronisation setup.

1. Click on **Application** and from the drop-down menu select **Settings**. The Workflow Engine App Settings window is displayed (Figure 2-20).

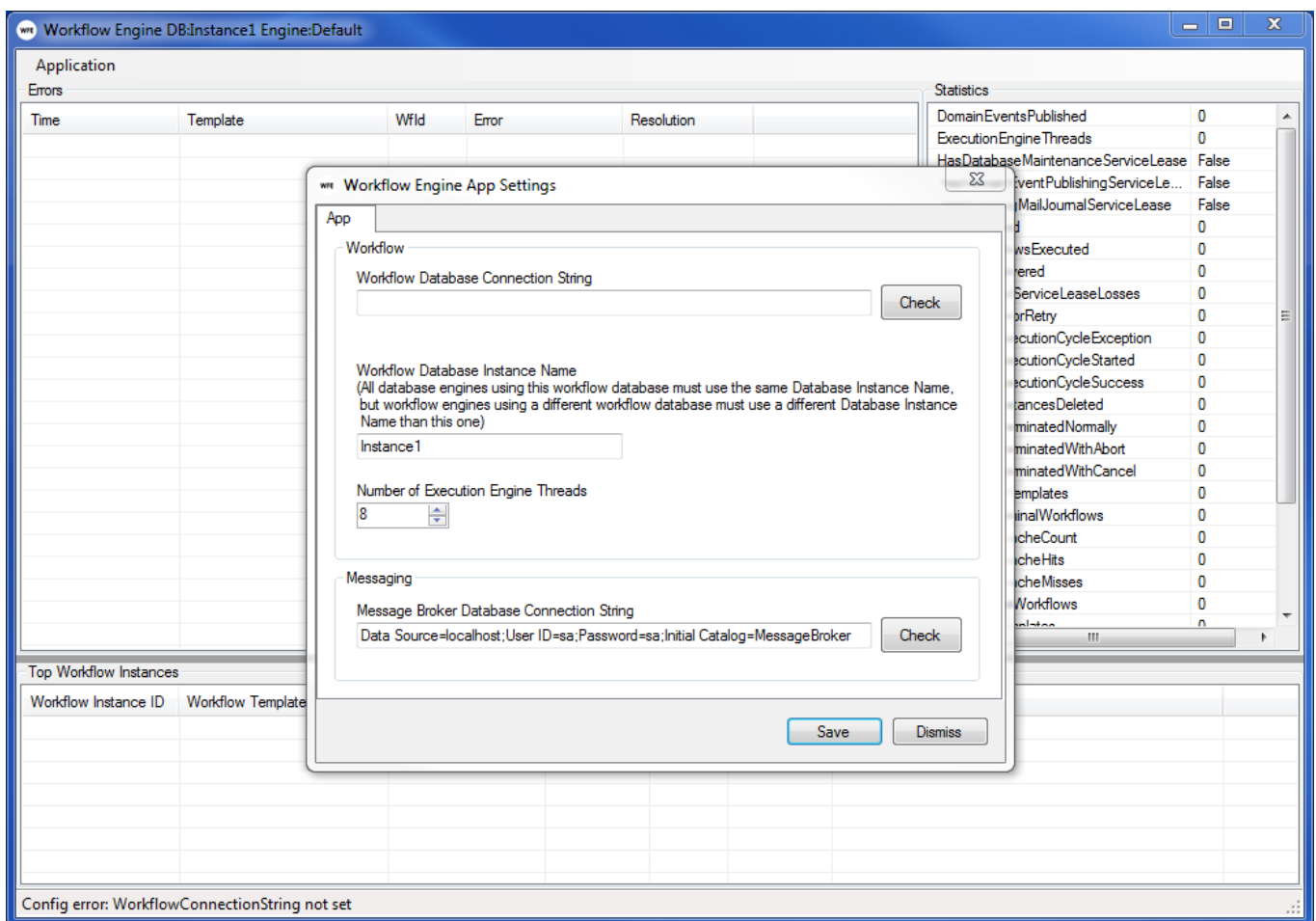


Fig. 2-20: Configuring the Workflow Engine App Settings

- Workflow Database Connection String

Enter the connection string that will provide access to the Workflow database. The properties for this string will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Workflow Database Instance Name

The unique name of this Workflow Database that identifies it to the Message Broker. All Workflow Engines using this database must be configured with its unique instance name.

Note: The Workflow Database Instance name field is automatically populated by the system when the Workflow Database Connection String **Check** button is pressed with a valid connection string.

- Number of Engine Execution Threads

This is a performance tuning parameter that will be automatically set to the processor count of the host system.

- Message Broker Database Connection String

The Deploy tool will have set the connection string to that configured on the Message Broker tab of the Deploy tool - it must be changed to the connection string of the Message Broker that is part of the Control System, the properties of which will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Save

Save any changes.

- Dismiss

Close the window.

2. Load the Workflow Template required for Tertiary synchronisation into the Workflow Engine.
 - a) From the Workflow Engine application window, click on **Application** then select **Templates** from the drop-down menu. The Workflow Templates window is displayed (Figure 2-21).

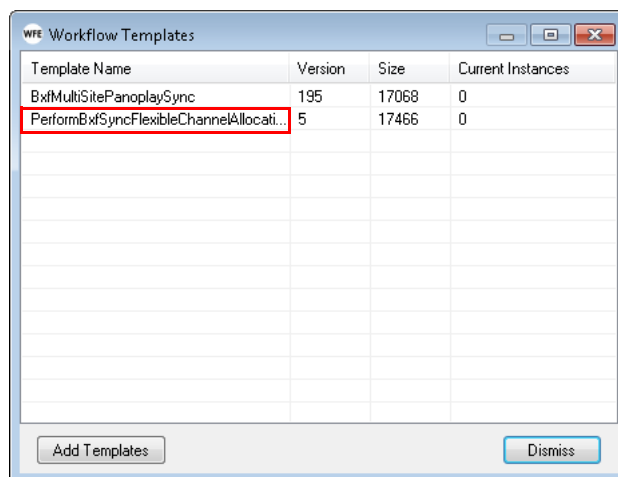


Fig. 2-21: Workflow Templates Window

The BXF synchronisation Workflow requires the following template file to be loaded into the Workflow engine:

PerformBxfSyncFlexibleChannelAllocationWF.wft

- b) Click on **Add Templates** and browse to the location of the required workflow template - it can be found in the Deploy folder.
- c) Click on **Dismiss** to finish.

3. Load the Workflow Initiator into the Workflow Engine. The role of the Workflow initiator is to launch the *PerformBxfSyncFlexibleChannelAllocation* Workflow when the BXF Sync process is started from the MIP panel.
 - a) From the Workflow Engine application window, click on **Application** then select **Initiators** from the drop-down menu. The Workflow Initiators window is displayed (Figure 2-22).

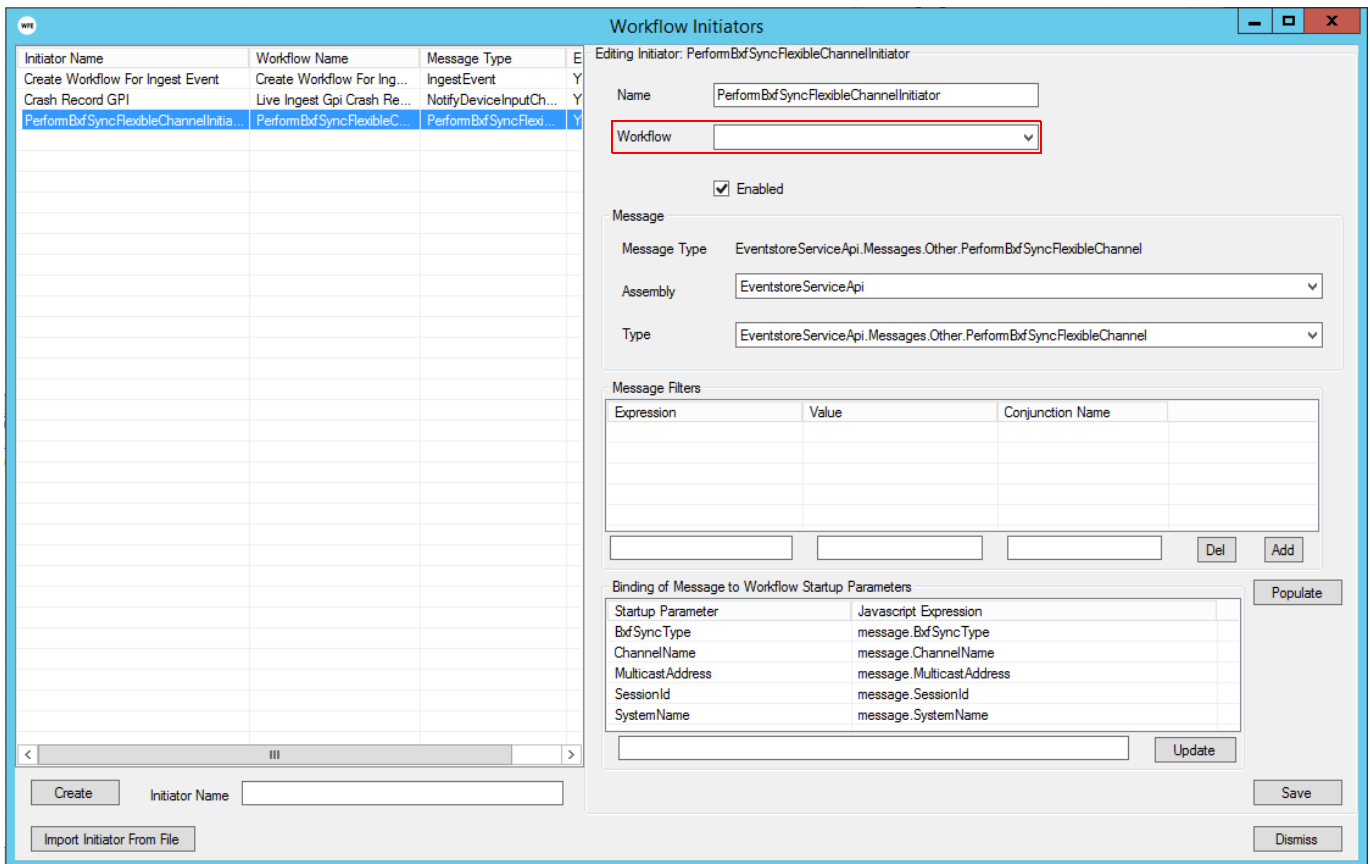


Fig. 2-22: Workflow Initiators Window

The *PerformBxfSyncFlexibleChannelAllocation* Workflow requires the following initiator file to be loaded into the Workflow engine:

PerformBxfSyncFlexibleChannelInitiator.wfi

- b) Click on **Import Initiator From File** and browse to the location of the required Workflow file - it can be found in the Deploy folder.

The file will be loaded into the Workflow Engine and appear in the list of initiators. Click on the initiator in the list in order to view its properties. The initiator is configured with the name of the required Workflow template which will be displayed as the *Workflow* property (Figure 2-22).

Note: Other than those mentioned herein, the properties of an initiator should not be modified - any such task is reserved for engineering.

- c) Ensure that the **Enabled** checkbox is ticked, click on **Save**, then click on **Dismiss** in order to close the window.

Tertiary: Configure the Morpheus Services

The following Morpheus applications are required to be configured for each participating system in order that they may fulfill the role of either Source or Target if elected to do so:

- **EventStore Service App**

The EventStore Service App has the following responsibilities towards synchronisation:

- Receives messages through the Message Broker (from other systems and processes) that are destined for the local Event Store during the execution of the Workflow.
- Processes requests from the local Event Store destined for the Message Broker during the execution of the Workflow.

A dedicated instance of the EventStore Service App must be created and configured for each Morpheus system participating in the selected sync mode. No other configuration of this service is necessary, apart from the change to the Message Broker connection string, detailed below.

The Deploy tool will have configured the EventStore Service App with the default Message Broker connection string - it must be changed in order to reference the Message Broker Database that is dedicated to the sync process.

1. Right click on the EventStore Service App shortcut and select **Properties** from the displayed menu.

The EventStore Service App Properties window is displayed (Figure 2-23).

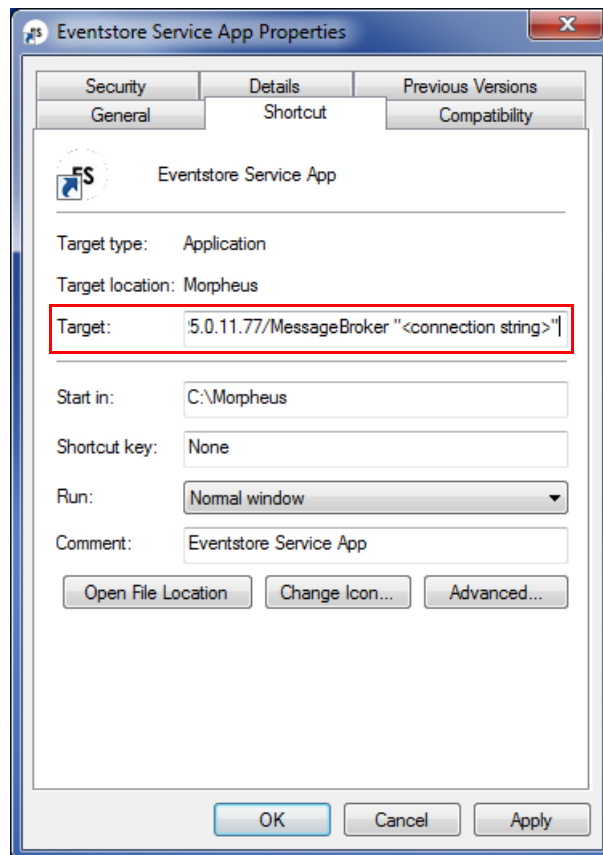


Fig. 2-23: Changing the Default Connection String

2. Append the Target field entry with the following qualifier:
/MessageBroker "<connection string>"

Where <connection string> is in the following format (example shown):

```
Data Source=<IP address>;User ID=sa;Password=sa;Initial Catalog=MessageBroker
```

Tertiary: Configure the BXF Services

The BXF Services that are required for Tertiary Synchronisation.

Note: All BXF service configurations are detailed in the Morpheus Engineering Supplement: BXF Service Configuration.

- **BXF Schedule Service**

- A Host Shell Service that runs on the Target system to send and receive BXF messages as part of the schedule synchronisation process during the startup procedure.
- Clears the Target system channel(s) and applies the schedule(s) received from the Source system.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Query Service**

- A BXF standards based Host Shell service that runs on the Source system during the startup procedure.
- Receives and processes BXF Query Messages containing channel information requests.

Note: As a passive service, it only responds to message requests.

This service does not require the intervention of a Message Broker in order to communicate.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Socket Writer**

An individual Host Shell service instance that provides a BXF communication path for the exchange of schedule information. It queries the BXF database for messages with destination services that it is configured for, transmitting them via an IP socket.

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

- **BXF Socket Reader**

The BXF Socket Reader Service reads BXF messages that have been transmitted from one or more BXF Socket Writer services (or equivalent services from a third party external system).

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

- **BXF Schedule Change Notifier Service**

- A Host Shell Service that runs on the Source system after the startup procedure has been completed.

- Sends schedule change messages to the Target system in order to maintain synchronisation.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

MultiSite Sync Configuration

The following Morpheus applications are required to be configured for each participating system in order that they may fulfill the role of either Source or Target if elected to do so.

Note: This mode also relies on participating Morpheus environments being configured for Panoplay, a task that is beyond the scope of this manual - refer to the Morpheus Engineer's manual for information.

MultiSite Sync: Configure the Message Broker Database

The BXF MultiSite Sync mode requires the configuration of a Message Broker Database - it is a commissioning task and therefore beyond the scope of this document.

The Message Broker Database has the following characteristics:

- Receipt, storage and retrieval of messages.
- Features a Message Broker for the exchange of messages for communication between software components (a mailbox is dedicated to each software component). Software component communication behaviour is based upon publishers, subscribers, and one-to-one direct messaging.

MultiSite Sync: Configure the BXF Database

The BXF MultiSite Sync mode requires the configuration of a BXF database - it is a commissioning task and therefore beyond the scope of this document.

The BXF Database has the following characteristics:

- The storage of BXF messages, pending processing by the appropriate BXF service.

MultiSite Sync: Configure the Panoplay Oracle XML File

Within the Panoplay configuration file there are three new sub-elements that must be inserted into the <Configuration> element at the bottom of the XML file as follows (the values shown are as an example only):

```
<Configuration>
....
  <MessageBrokerConnectionString>Data Source=192.168.50.100;User ID=sa;Password=sa;
  Initial Catalog=MorpheusMessagingDR</MessageBrokerConnectionString>
  <BxfSyncGroup>LondonBirmingham</BxfSyncGroup>
  <BxfSyncSite>London</BxfSyncSite >
</Configuration>
```

IMPORTANT: These amendments must be made in both of the Panoplay environments.

- <MessageBrokerConnectionString>

The connection string for the Control System Message Broker dedicated to the synchronisation process (referenced in Figure 2-8).

-<BxfSyncGroup>

Identifies the synchronised Panoplay environment to the Message Broker - the Panoplay systems to be synchronised must belong to the same BxfSyncGroup.

- <BxfSyncSite>

Identifies the local Panoplay environment within the BxfSyncGroup. All BxfSyncSite names must be unique.

MultiSite Sync: Configure the Workflow Engine

Note: The Workflow Engine relies upon a dedicated Workflow Database that must have been created previously - the creation of the Workflow database is a commissioning exercise, and is therefore beyond the scope of this document.

The Workflow orchestrates communication between the system components that are responsible for linking the channels for the purpose of synchronisation. It has the following characteristics:

- Subscribes to the start / stop message type from the MultiSite Control user interface for the initiation or shutdown of the BXF Synchronisation mechanism
- Interrogates all systems in order to ascertain which has Leader status
- Multiple instances of a Workflow can be created within a single Control System for the support of many Panoplay sync sets - each has a unique identifier
- The Workflow adapts if a Source / Target change occurs in Panoplay

Note: Only one Workflow Engine is required for the MultiSite Sync setup.

The Workflow Engine App is started from the Morpheus Shortcuts window.

1. Click on **Application** and from the drop-down menu select **Settings**. The Workflow Engine App Settings window is displayed (Figure 2-24).

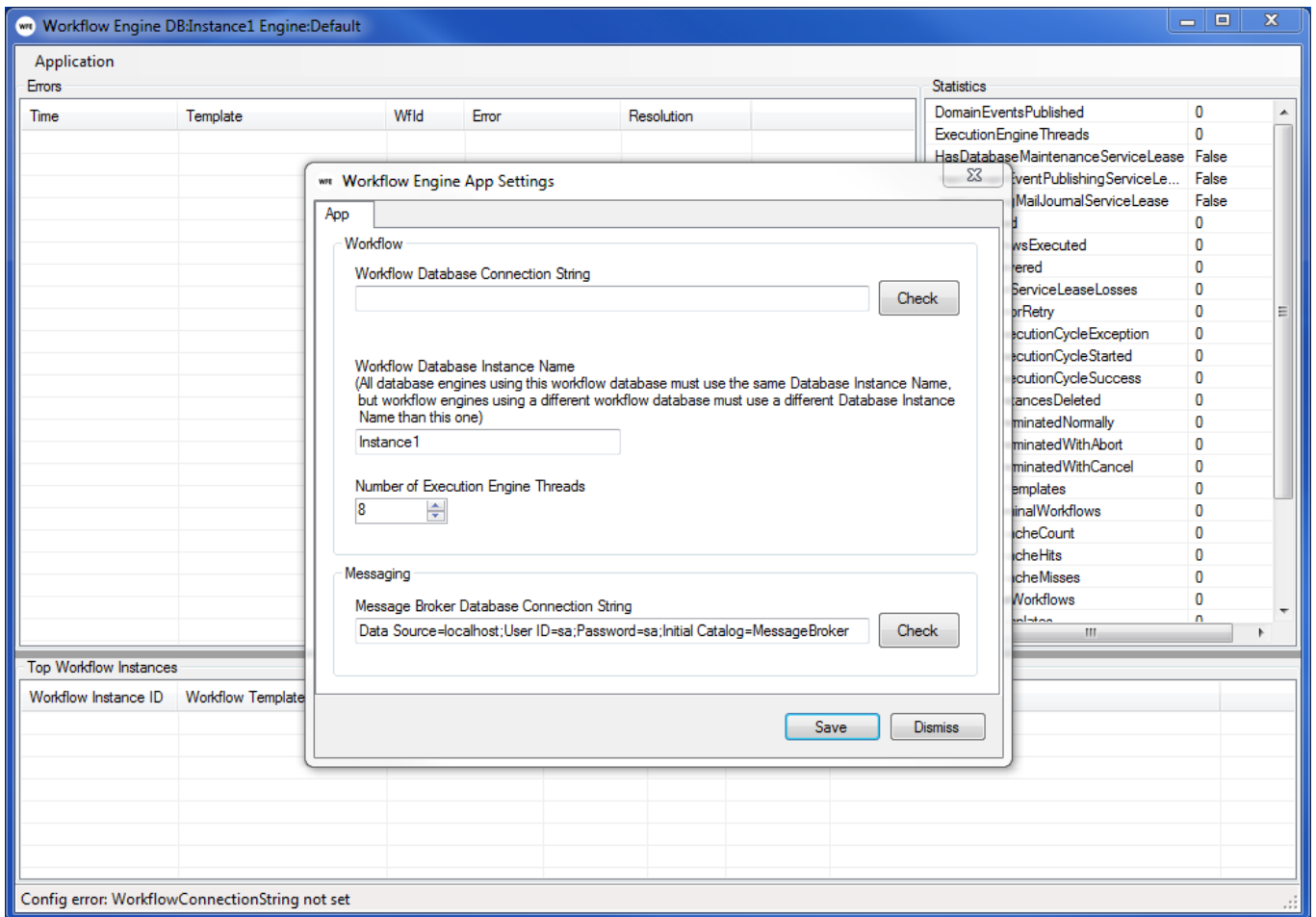


Fig. 2-24: Configuring the Workflow Engine App Settings

- Workflow Database Connection String

Enter the connection string that will provide access to the Workflow database. The properties for this string will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Workflow Database Instance Name

The unique name of this Workflow Database that identifies it to the Message Broker. All Workflow Engines using this database must be configured with its unique instance name.

Note: The Workflow Database Instance name field is automatically populated by the system when the Workflow Database Connection String **Check** button is pressed with a valid connection string.

- Number of Engine Execution Threads

This is a performance tuning parameter that will be automatically set to the processor count of the host system.

- Message Broker Database Connection String

The Deploy tool will have set the connection string to that configured on the Message Broker tab of the Deploy tool - it must be changed to the connection string of the Message Broker that is part of the Control System, the properties of which will have been configured at the time of the database creation.

Verify the validity of the connection string by pressing the **Check** button.

- Save

Save any changes.

- Dismiss

Close the window.

3. Load the Panoplay Workflow Initiators into the Workflow Engine

The role of the Workflow initiator is to launch the BxfMultiSitePanoplaySync Workflow upon starting the BXF Sync process from the MultiSite Control User Interface.

- a) From the Workflow Engine application window, click on **Application** then select **Initiators** from the drop-down menu. The Workflow Initiators window is displayed (Figure 2-26).

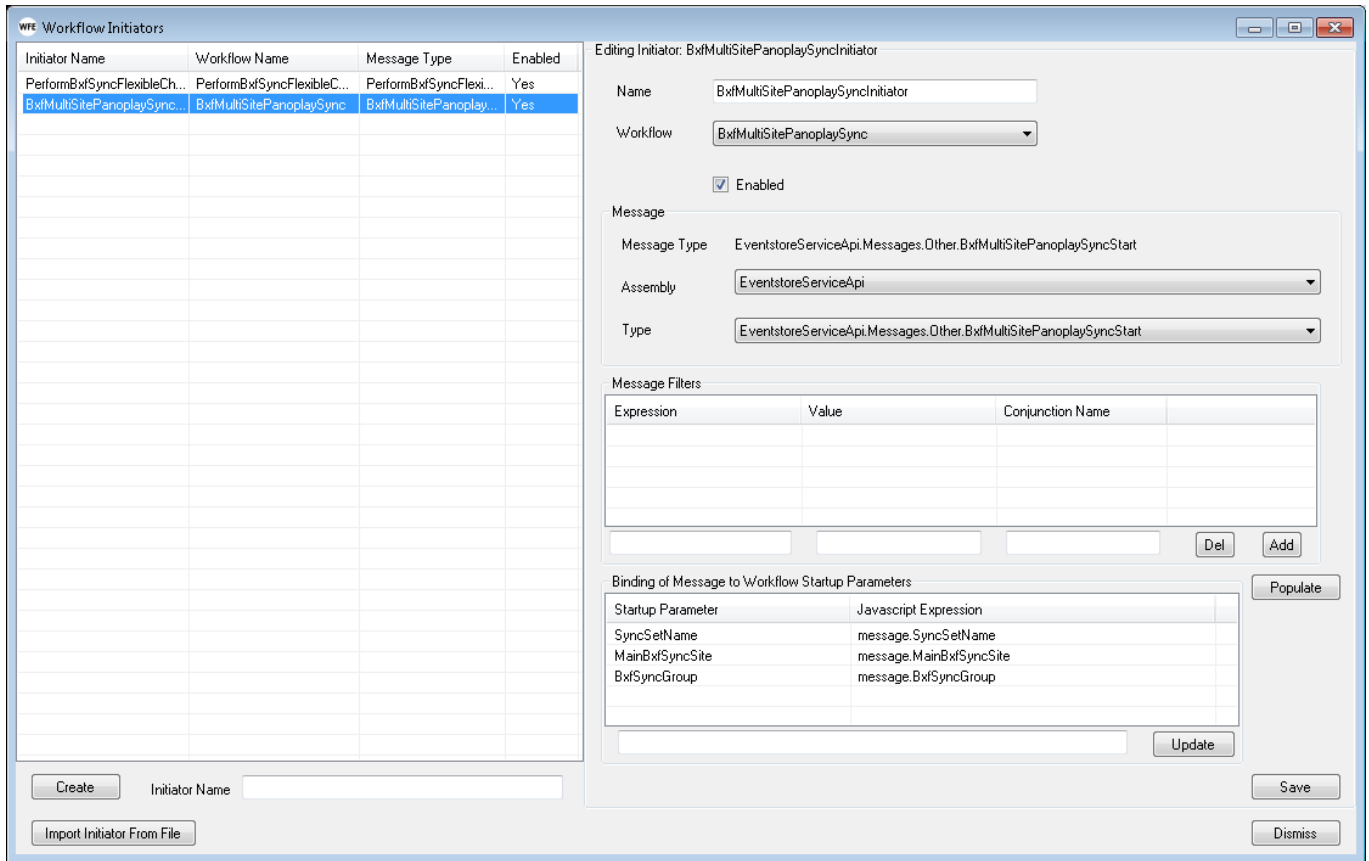


Fig. 2-26: Workflow Initiators Window

The Panoplay Workflow BxfMultiSitePanoplaySync requires the following initiator file to be loaded into the Workflow engine:

BxfMultiSitePanoplaySyncInitiator.wfi

- b) Click on **Import Initiator From File** and browse to the location of the required Workflow file - it can be found in the Deploy folder.
The file will be loaded into the Workflow Engine, and appear in the list of initiators. Click on the initiator in the list in order to view its properties. The initiator is configured with the name of the required Workflow template which will be displayed as the *Workflow* property (Figure 2-26).

Note: Other than those mentioned herein, the properties of an initiator should not be modified - any such task is reserved for GV engineering.

- c) Ensure that the **Enabled** checkbox is ticked, click on **Save**, then click on **Dismiss** in order to close the window.

MultiSite Sync: Configure the MultiSite Control Application

The MultiSite Control application examines the Panoplay xml configurations in order to determine the existence of the Panoplay Sync Sets that are configured into the BXF Sync Group - the BXF Sync Group and its allocated Panoplay Sync Sets are then displayed on the Multi-Site Control User Interface.

Configure the Multi-Site Control application using the MultiSite Control executable (MultisiteControl.exe) that can be found in the Morpheus installation directory - it is deployed automatically with either Panoplay Oracle or Panoplay Agent.

1. Double-click on **MultisiteControl.exe**

An unpopulated MultiSite Control User Interface is displayed (Figure 2-27).

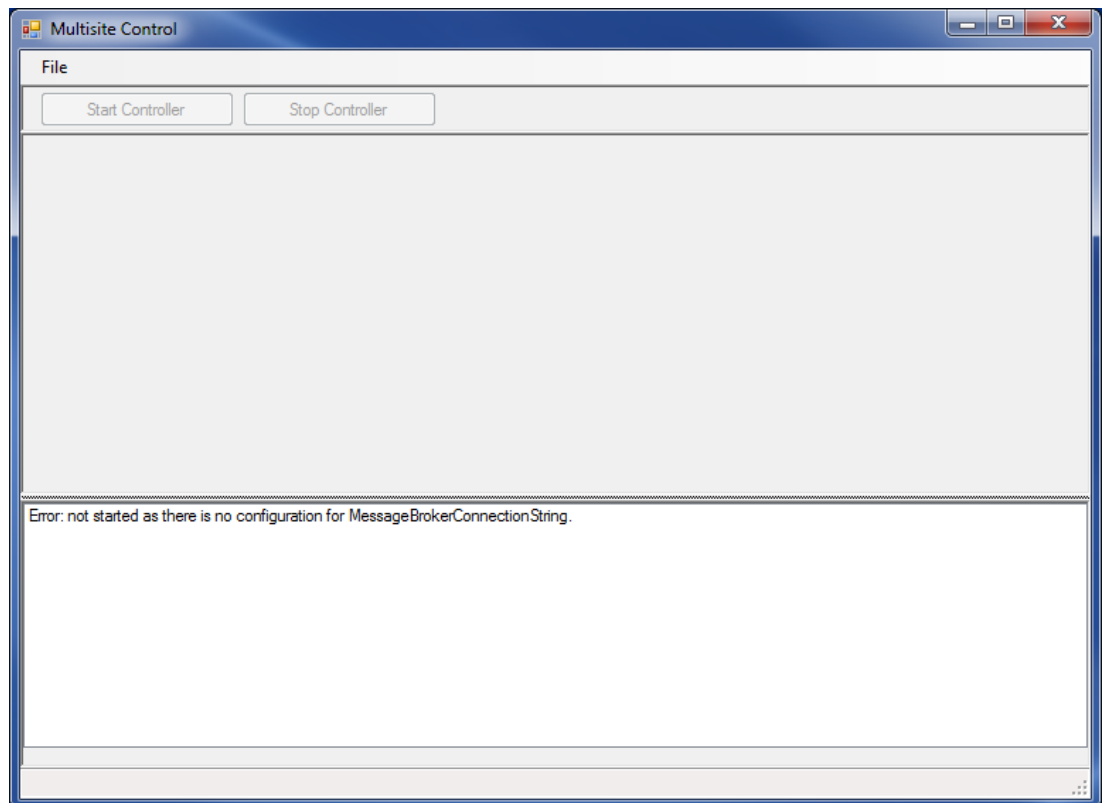


Fig. 2-27: Unpopulated MultiSite Control User Interface

2. Click on **File**, then on **Configuration** from the drop-down menu.

The Configuration window is displayed (Figure 2-28).

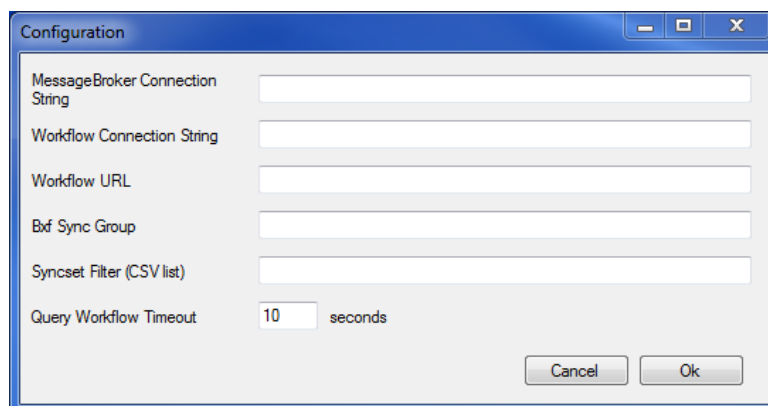


Fig. 2-28: MultiSite Control Configuration

- Message Broker Connection String

The connection string for the Message Broker Database that is dedicated to the BXF synchronisation process, as shown in Figure 2-9.

- Workflow Connection String

The connection string for the Workflow database that is dedicated to the BXF synchronisation process.

- Workflow URL

Enter the URL of the Workflow Web App Server - it allows the Workflow instance execution to be viewed in a web browser for engineering and support purposes.

Once configured, a hyperlink will be displayed alongside each sync set on the MultiSite Control User Interface in order to provide access to the Workflow instance execution.

Note: Access to the Workflow instance is provided for engineering debugging purposes only.

- BXF Sync Group

The name of the BXF Sync Group with which the MultiSite Control application will interact - the name must match that which is specified in the `<BxfSyncGroup>` element of the Panoplay configuration XML.

- Syncset Filter (CSV List)

Configurable filters that prevent selected Panoplay Sync Sets from being displayed on the MultiSite Control User Interface in order to prohibit their sync state from being manually altered. Enter the name of each sync set to hide separated by a comma (**Comma Separated Values**).

- Query Workflow Timeout

The interval at which the MultiSite Control application will poll the Workflow Engine in order to ensure that it is operational.

The default is 10 seconds (the recommended setting).

If no reply is received, an error message is displayed in the log pane of the MultiSite Control User Interface window in order to alert the operator. The MultiSite Control application will continue to poll the Workflow Engine at the specified interval.

The following XML is generated in the *MultiSiteControlConfig.xml* file:

```
<?xml version="1.0"?>
<MultisiteControlConfig xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <BxfSyncGroup>LondonBirmingham</BxfSyncGroup>
  <SyncSetFilter />
  <QueryWorkflowTimeout>10</QueryWorkflowTimeout>
  <MessageBrokerConnectionString>Data Source=172.31.200.17;User ID=sa;Password=sa;Initial
Catalog=MESSAGING_INTERSITE</MessageBrokerConnectionString>
  <WorkflowConnectionString>Data Source=172.31.200.17;User ID=sa;Password=sa;Initial
Catalog=WORKFLOW_INTERSITE</WorkflowConnectionString>
  <WorkflowUrl>http://172.31.200.17:8888</WorkflowUrl>
</MultisiteControlConfig>
```

Should changes be required to *MultisiteControlConfig.xml*, then a restart of the MultiSite Control User Interface will be required - no interruption to the synchronisation will occur, and the interface will automatically determine the current sync state.

MultiSite Sync: Configure the Morpheus Services

The following Morpheus Services are required to be configured for each participating system in order that they may fulfill the role of either Source or Target if elected to do so:

EventStore Service App

The EventStore Service App has the following responsibilities towards synchronisation:

- Receives messages through the Message Broker from other systems and processes those that are destined for the local Event Store during the execution of the Workflow
- Processes requests from the local Event Store destined for the Message Broker during the execution of the Workflow

A dedicated instance of the EventStore Service App must be created and configured for each Morpheus system participating in the selected sync mode. Apart from the change to the Message Broker connection string, detailed below, no other configuration of this service is required.

The Deploy tool will have configured the EventStore Service App with the default Message Broker connection string - it must be changed in order to reference a Message Broker Database that is dedicated to the sync process.

Change the Message Broker connection string in the shortcut properties of the service, as follows:

1. Right click on the EventStore Service App shortcut and select **Properties** from the displayed menu.

The EventStore Service App Properties window is displayed (Figure 2-29).

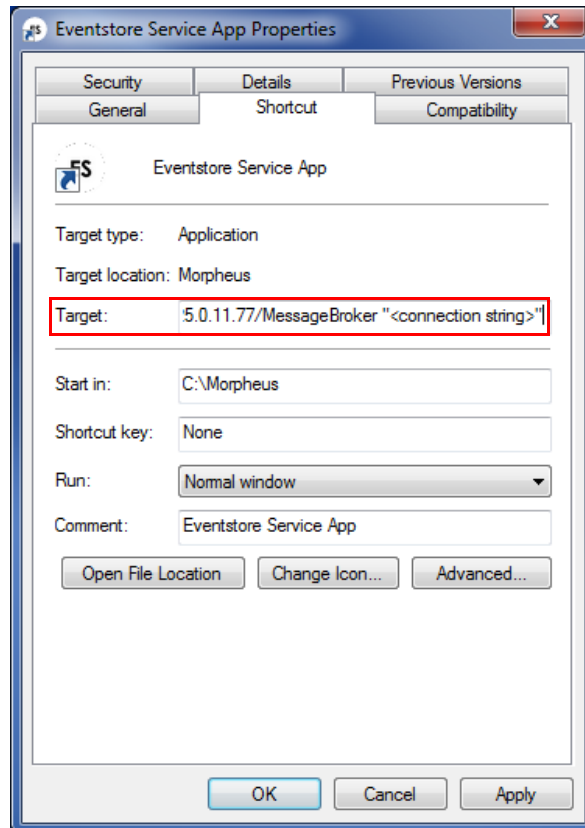


Fig. 2-29: Changing the Default Connection String

2. Append the Target field entry with the following qualifier:

/MessageBroker "<connection string>"

Where <connection string> is in the following format (example shown):

```
Data Source=<IP address>;User ID=sa;Password=sa;Initial Catalog=MessageBroker
```

MultiSite Sync: Configure the BXF Services

The BXF Services that are required for MultiSite Sync.

Note: All BXF service configurations are detailed in the Morpheus Engineering Supplement: BXF Service Configuration.

- **BXF Query Service**

A service that processes received BXF Query Request messages containing channel information requests, and interrogates the Morpheus EventStore for the required information. The results are converted into a BXF Query Response for transmission to the originating system.

Note: As a passive service, it only responds only to message requests.

This service does not require the intervention of a Message Broker in order to communicate.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Schedule Service**

- A Host Shell Service that is active on the Target to receive schedules in a BXF format from which it will update the EventStore.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Schedule Change Notifier Service**

- A Host Shell Service that runs on the Source system to transmit schedule change messages to the Target system in order to maintain synchronisation.

- Upon receipt of schedule change notifications directly from the EventStore, this service will generate a BXF message for transmission to preconfigured destinations. The service receives notifications from the EventStore for all channels.

Note: All Morpheus systems must run this service, as each has the capacity to be either a Source or a Target.

- **BXF Socket Writer**

An individual Host Shell service instance that provides a BXF communication path for the exchange of schedule information. It queries the BXF database for messages with destination services that it is configured for, transmitting them via an IP socket.

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

- **BXF Socket Reader**

The BXF Socket Reader Service reads BXF messages that have been transmitted from one or more BXF Socket Writer services (or equivalent services from a third party external system).

Note: A socket reader and a socket writer pair must be configured for each active Morpheus system.

MultiSite Sync: Example Configurations

Configuring the BXF Query Service

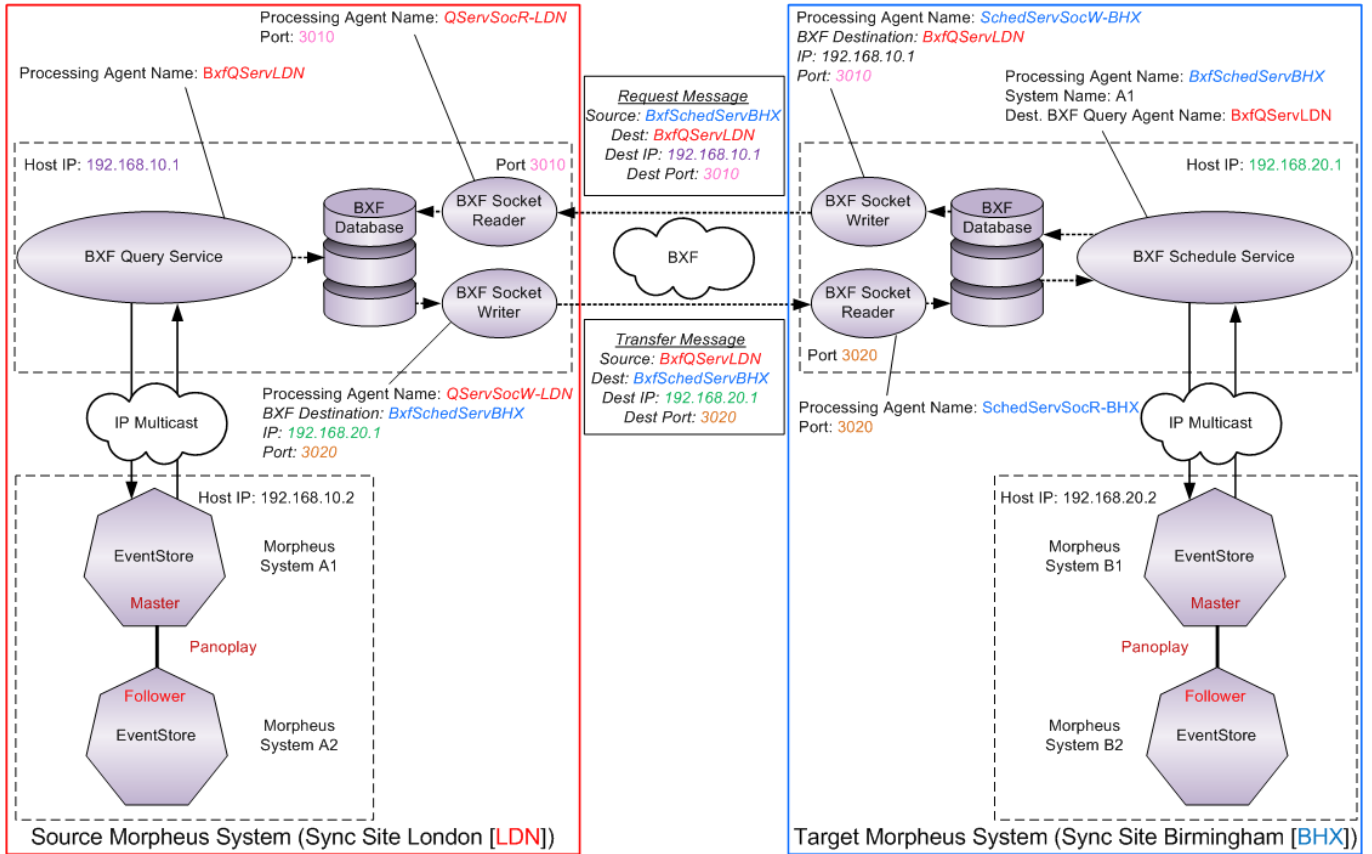


Fig. 2-30: Messaging Configuration Example: BXF Query Service

Note: In this example, the BXF services are shown as running on the same physical host device on each site.

Configuring the BXF Schedule Change Notifier Service

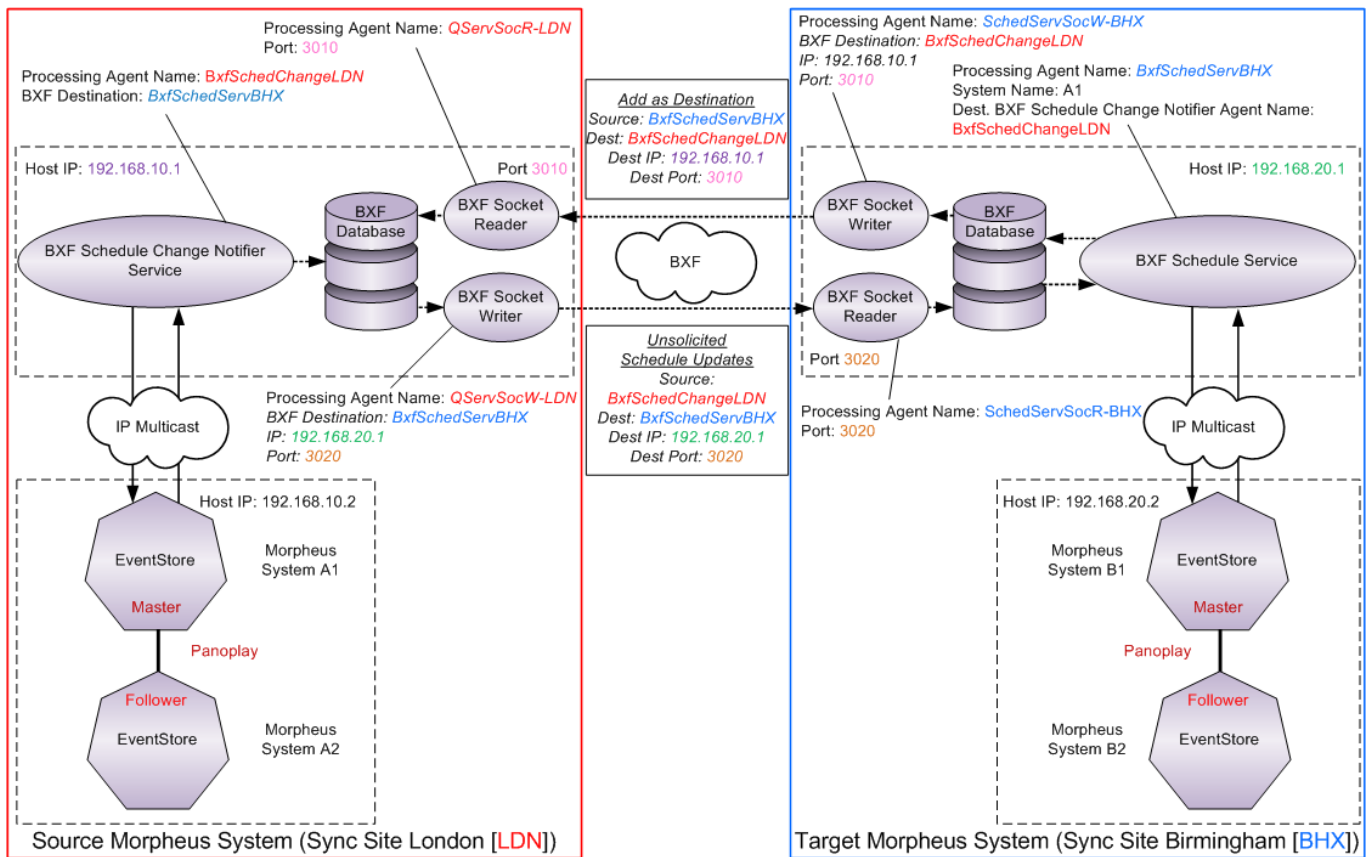


Fig. 2-31: Messaging Configuration Example: BXF Schedule Change Notifier Service

Note: In this example, the BXF services are shown as running on the same physical host device on each site.

Failure and Recovery Procedures

No failure recovery processes are incorporated into any of the synchronisation modes detailed in this document.

Any transition from a live to a backup system must be instigated outside of the synchronisation mechanisms, whether that be by manual means or otherwise.

IMPORTANT: Upon any failure, where a transition is required between the live and backup system, then synchronisation must be stopped. For instructions, refer to the details on the mode that is in use.



Grass Valley Technical Support

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UK Office

The department is staffed from 9.00am to 5:30pm Monday to Friday (excluding UK public holidays).

Outside these times, calls will be delivered to voicemail for follow up on the next working day.

Additional support is available outside these hours by purchasing a support contract, details of which are available from the Grass Valley website and through the account manager.

Customers with an existing support contract should call their personalised number, which can be found in the contract, and be ready to provide the contract number and details.