Honeywell

Experion PKS

Guidelines for Replacing Hiway Boxes with LCN-connected C300 Emulations

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Contents

1 About this guide

This document provides guidelines for replacing Hiway Boxes with LCN-connected C300 emulations. The replacement of the legacy Hiway boxes with the Experion C300 controllers can be achieved by creating emulations of the Hiway boxes and their algorithms to run in Experion controllers.

Revision history

Revision	Date	Description
A	February 2015	Initial release of the document.

Related documents

- *Hiway Slot Emulation Creator User Guide*
- *Control Building User's Guide*

2 Overview

The Experion Hiway Bridge (EHB) gateway and an associated set of CEE-based emulation strategies allow the Experion C300 Controller to connect to the LCN as a replacement for controllers of the TDC-2000 Hiway. These enablers can be used to migrate legacy TDC-2000 Hiway equipment to the current generation Experion DCS without the need to eliminate the LCN.

This solution enables TDC customers to:

- Retain their supervisory control strategies, custom graphics, and level 3 applications.
- Preserve their investment in the supervisory control strategies, custom graphics, and level 3 applications.
- Preserve the original HG points as faceplates so that the operational view from the LCN displays is not affected.
- Migrate to Experion through hot or cold cut-over as per their convenience. This technique of migration distributes the investment needed over a customer-defined span of time compared to a rip-and-replace method of migration, and also minimizes the production loss during switchover.
- Minimize the effort required to migrate TDC-2000 Data Hiway and Hiway boxes to the latest generation Experion controllers for LCN/Hiway systems.
- Reduce costs involved in operator training on Experion.

EHB enables the TDC Hiway customers to replace their legacy controllers with the Experion C300 Controllers. At a high-level, this replacement is accomplished by performing the following:

- Enhance the existing Hiway Gateways to coexist in the LCN and the Experion FTE Network - EHB is the enhanced HG that is capable of connecting to the Hiway boxes on the LCN as well as their C300 emulations that are loaded on to the Experion C300 controllers.
- Create emulations of Hiway boxes and their algorithms to run in Experion controllers - Emulated boxes run in the C300 controller using CEE block strategies, which are functional equivalents of the legacy algorithms supplied by the Hiway box. The emulations supply parameters, which are linked to the HG point in the same way as the original box. Behavior of the emulations in terms of control, parameter access, and alarms closely matches that of the original algorithms.

Emulations

With Experion R431, the following algorithms of the Basic Controllers (CB) and Extended Controllers (EC) can be emulated.

Basic Controller Algorithms

CB AUTOBIAS	CB PIDCM
CB AUTOMAN	CB PIDCMA
CB AUTRATIO	CB PIDERSQG
CBSUMR	CB PIDERSQI
CB DAS	CB PIDGAP
CB DIVIDR	CB PIDNORM
CB HISEL	CB PIDRATIO
CB LEADLAG	CB PIDSPC
CB LOSEL	CB RVAI
CB MULT	CB SQRT
CB MULTWMAN	CB SQRTPROD
CB OVEHISEL	CB SUMRWMAN
CB OVERLOSEL	CB SUMSQRT
	CB SWITCH
Extended Controller Algorithms	
EC AUTOMAN	EC MULTDIV
EC CHARACT	EC PIDDDC
EC DAS	EC PIDDDCSP
EC DEADTM	EC PIDNORM
EC DI	EC PIDSPC
EC LEADLAGS	EC PIDGAP
EC LEADLAGM	EC RAMPSOAK
EC LOGIC	EC SELOVDDC
EC MASSFLOW	EC SUMR
	EC SWITCH

2.1 New hardware components

To enable replacement of the Hiway boxes with the LCN-connected C300 emulations, the following hardware components are introduced.

Experion Hiway Bridge Interface (EHBI)

An additional interface board is used to establish connectivity between the K4LCN processor with the modified HG personality and the FTE network.

Refer to the TPN R685 documentation for more information on EHBI.

Experion Hiway Bridge (EHB)

EHB is an enhanced LCN Hiway Gateway (HG) capable of connecting to the Hiway box emulations in the C300 Controller through the FTE network. The emulated boxes are functionally equivalent to the Hiway boxes. A new card called EHBI is introduced to establish connection with the FTE network. The HG's LCN connectivity through its K4LCN card remains unchanged.

The following figure illustrates the network connectivity between the emulated Hiway boxes and EHB through the FTE.

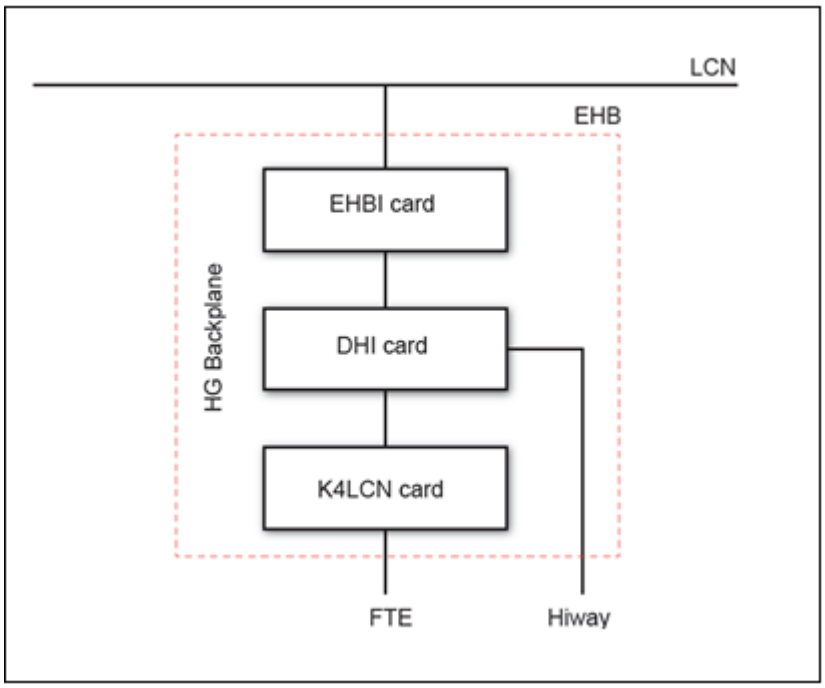


Figure 1: Network connectivity between emulated Hiway boxes and Experion Hiway Bridge (EHB)

2.2 Simple gateway configuration

In a simple gateway configuration, EHB provides an interface for connectivity between the LCN and the emulations of Hiway boxes in the Experion network. The emulations of Hiway boxes, which are functionally equivalent to the physical Hiway boxes, exist in the C300 controllers on the Experion network. The EHB and the C300 controllers are connected through FTE. Therefore, EHB functions as a one-to-one gateway that connects the LCN and the FTE network.

However, in a simple gateway configuration, EHB does not facilitate connectivity to the Data Hiway.

Consider the following illustration, in which the box CB1 has been migrated to C300. Therefore, the emulations of the Hiway box, CB1, exist in C300. The LCN nodes can now read data of the migrated CB1 in the required format from C300 through EHB. EHB provides the required interface for the LCN nodes to connect to the emulated Hiway box in the C300 controller, through the FTE.

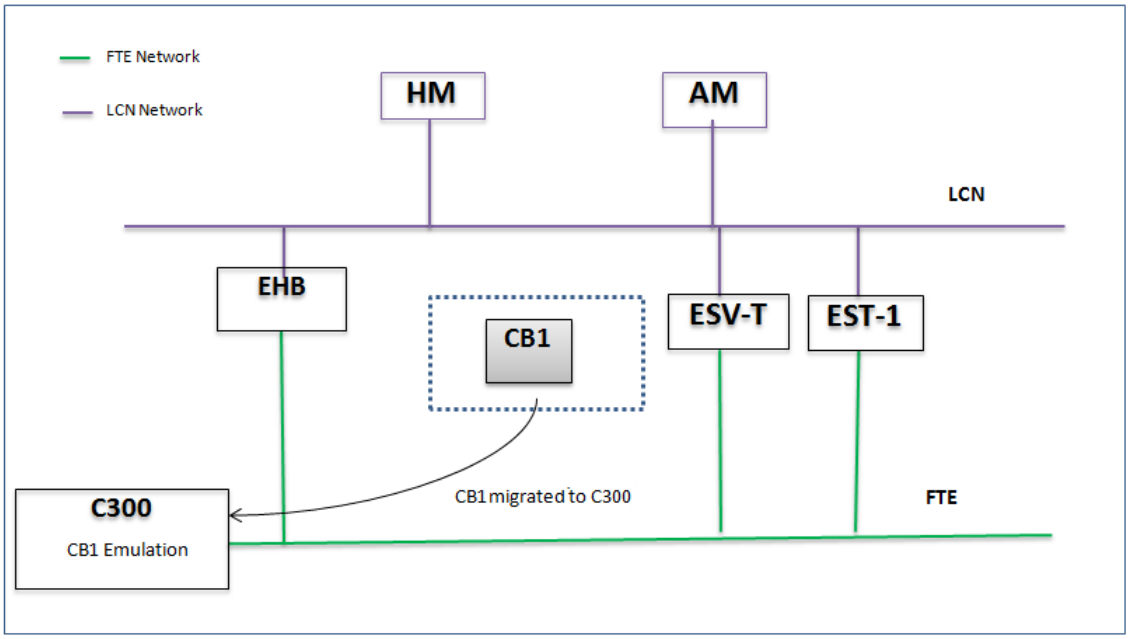


Figure 2: EHB in a simple gateway configuration

Note

In a Simple Gateway configuration, you cannot perform a hot cutover. Migration from Hiway controller to C300 emulations must be done offline.

2.3 Junction gateway configuration

In a junction gateway configuration, EHB functions as a one-to-two gateway, in which the LCN nodes can connect to the Data Hiway and the FTE. Junction gateway supports the co-existence of Hiway boxes and the C300 controllers that emulate the Hiway boxes.

Therefore, EHB as a junction gateway facilitates the following:

- Connectivity between the LCN nodes and the FTE network - The LCN nodes communicate with the emulations of Hiway boxes in the C300 controllers through EHB.

  Note
  The EHB and the C300 controllers on the Experion network are connected through FTE.

- Connectivity between the LCN nodes and the Data Hiway - Physical Hiway boxes that are not migrated continue to communicate with the LCN nodes through EHB.
- Gradual migration from Hiway to emulation

Consider the following illustration, in which the box CB1 has been migrated to C300, while boxes CB2 and CB3 are on the Data Hiway. The LCN nodes can read data of the migrated CB1 in the required format from C300 through EHB. The LCN nodes can also read data from CB2 and CB3 through EHB.

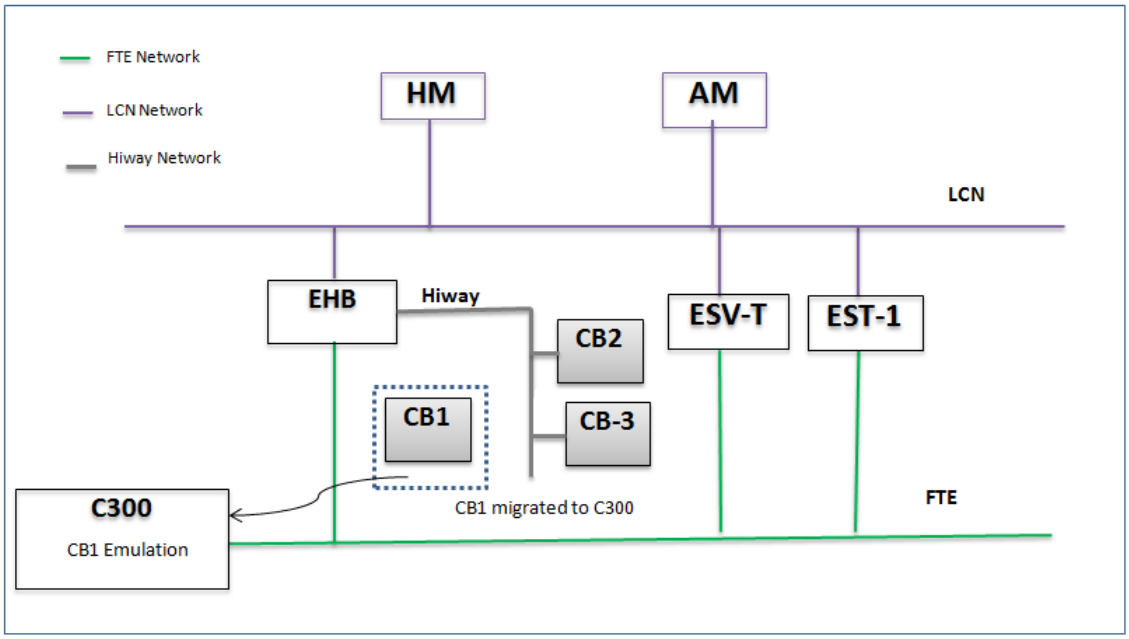


Figure 3: EHB in a junction gateway configuration

2.4 Software components

To enable replacement of the Hiway boxes with the LCN-connected C300 emulations, the following software components are introduced.

HSE Creator Tool

The HSE Creator Tool, a new translator tool, facilitates the translation of Hiway box and slot configuration into standard Experion Control Builder configuration files (cnf.xml files). These files can then be imported into ERDB to create Control Module configuration which emulate the functionality of Hiway slots.

The approach followed for translating Hiway box and algorithm slots into cnf.xml files is using the Hiway Slot Emulation (HSE) pattern strategies. These pattern strategies are pre-defined by Honeywell as part of developing the HSE Creator Tool. These are sets of Control Modules used as models for creating Control Module instances to run in C300s. The instances so created replace the Hiway box configuration or algorithm slot configuration. Different pattern CM strategies are used as models when translating different types of Hiway slot algorithms.

HSE patterns are stored in a database used by the HSE Creator tool. They can partially be customized, if required.

Enhancements to the control execution environment

- Emulated algorithms - The cnf.xml files that are imported into Control Builder create Control Module configuration which emulate the functionality of Hiway slots. The box slot of a Hiway box is always replaced with a single CM. Algorithm slots are replaced by one or more CMs based on the user preference.

  Slot algorithm emulations are called Hiway Algorithm Slot Emulation (HASE) and box emulations are called Hiway Box Slot Emulation (HBSE). These emulations are loaded to the Experion C300 Controller.

  For more information, refer to “Concept of emulation” on page 25.
- Hiway Responder Blocks (HRBs) - The HRBs are special purpose communication blocks that support transfer of Hiway messages between the C300 Controller and the LCN EHB.

Experion Hiway Bridge Interface (EHBI)

EHB platform block - A new platform block is introduced to configure the emulation properties of a physical Hiway emulation.

Enhancement to the ESV-T

Combo Point functionality - When an EHB is used to connect Experion controllers to an LCN network, identical tag names can exist both on the HG point and on the algorithm CM. In such scenarios, if you load the HASE to the ESV-T, name collision can occur. To manage such name collisions, Combo Point functionality is introduced.

When a tag is configured as a Combo Point, ESV-T looks for its parameters first on the HG point in the EHB. If a parameter cannot be found in EHB, then it is accessed from the HASE in the CEE.

Extension to the CEE block to support Hiway communication

A new tab called the EHB Communications tab is added to the CEEC300 platform block. It is used to identify the EHBs used for emulated Hiway communications and to view statistics related to such configuration.

Refer to the Experion *C300 Controller User’s Guide* for more information.

Enhancements to the TPN system displays and custom graphics

When the EHB is deployed, Hiway emulations running in C300 controllers are operated through the TPN view rather than the Experion view.The TPN displays and custom graphics are enhanced for viewing and controlling the process after cut-over. The TPN displays are enhanced to differentiate between the HG point when it is on emulation and when it is over a physical Hiway. TPN system display provides FTE network status and EHBI board status.

Refer to the TPN R685 documentation for more information.

Updated LCN software

Refer to the TPN *Process Operations Manual* for more information.

Cut-over Management Display

Hot-cutover is managed from a display called the Cutover Management Display. This display focuses on supporting process operation during the transition of a box in a box-by-box method of hot cut-over. For more information, refer to “About the Cut-over Management display” on page 94.

The Cutover Maintenance Display is a pop-up display invoked from the Cutover Management Display. It helps the maintenance engineer to view, maintain, and alter key identified process parameters during the transition from physical HG boxes (CB and EC) to emulated boxes. For more information, refer to “About the Cut-Over Maintenance Display” on page 101.

EHB-specific C300 application image

An application image to run Hiway emulations in a C300 controller is introduced. This application image is different from the application image normally used with a C300 controller. To run emulations in C300, the EHB-specific C300 firmware must be loaded.

For more information about loading EHB-specific C300 controller firmware, refer to “Loading EHB-specific C300 Controller firmware” on page 34.

For more information about the EHB-specific C300 image, refer to the *Control Builder Components Reference*.

2.5 Topology diagram of the Hiway boxes replaced with the LCN-connected C300 emulation

The following figure displays a sample topology diagram which illustrates how the Hiway boxes are replaced with Experion Series-C controller and IOs.

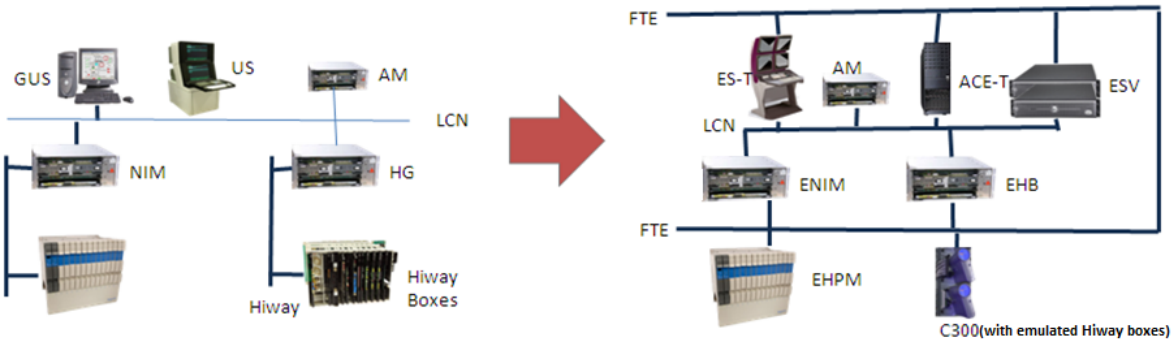


Figure 4: Hiway boxes replaced with the LCN-connected C300 emulations

2.6 Experion and TPN releases that support replacement of the Hiway boxes with the LCN-connected C300 emulations

Replacement of the Hiway boxes with the LCN-connected C300 emulations is supported in the following release versions of Experion and TPN.

- Experion R431.1 and later - Refer to the Experion Migration documents for more information on Experion migration.
- TPN R685.3 and later - Refer to the TPN R685.3 Customer Release Guide for the migration procedure.
  - K4 upgrade - K4 upgrade of the HG nodes must be done along with R685.3 migration. Refer to the TPN R685.3 Customer Release Guide for the upgrade procedure.

3 Planning

The following list summarizes the planning that must be performed for replacing the Hiway boxes with the LCN-connected C300 emulations.

- Ensure that you have the Experion-TPS system setup.

  Sites can be categorized as follows:

  – Sites with an existing TPN network only

    If the site has a TPN network only, ensure that you configure Experion in your existing setup.

    For more information about appropriately planning and configuring the Experion network, review the chapters, *Configure Experion Database* and *Multiple Experion Clusters on one LCN* in the *Integrated Experion-TPS User's Guide*.

  – Sites with an existing Experion and TPN network

    If the site has an existing Experion and TPN network, ensure that you review the chapters, *Configure Experion Database* and *Multiple Experion Clusters on one LCN* in the *Integrated Experion-TPS User's Guide* to ensure that the existing setup adheres to the recommended guidelines.

- Identify the topologies that you are planning to migrate.
- Plan for all EHBs that must be connected to the emulation of the same physical Hiway.
  – Identify all HGs connected to the physical Hiway .
  – Record each HG by LCN number, HG number, and logical Hiway number.
  – Define all EHBs, which are to be connected to the emulation of the physical Hiway being migrated, replacing the HGs.

    This record includes ESVT details, EHB name, logical Hiway number, and IP address.

  – Once the configuration of a physical Hiway emulation is planned in its entirety, and verified, you can start with the configuration of the first EHB.
- HG configuration EB files - Identify the box and the slot algorithms that must be migrated. Collect the EB files of the points residing in a box which is planned for cut-over and preserve the data as a back up and for future reference.
- Complete the IO module planning - Identify the slots that are to be connected as AI input, PV input, PV output and so on. Ensure that the respective IO modules are created in the Project view of the Control Builder.
- Plan for switching the wiring from boxes to the Experion Series-C IO modules based on your IO module planning.
- Plan for distribution of boxes under different C300 Controllers. Boxes to C300 emulation sizing has to be done as per the guidelines provided. No C300 can host emulation of boxes which are part of different physical Hiways. No Hiway box can be split across multiple C300s. You must refer to the EHB specifications for the following information.
  – Maximum number of Hiway boxes that can be emulated in a single C300 Controller.
  – Maximum number of emulation C300s that can be connected to one EHB.

    Include C300 under RemoteHGs in addition to ThisHG and AddedHG.

For more information about ThisHG, AddedHG, and RemoteHG, refer to “About Hiway number, box address, and box assignment” on page 19.

– Maximum number of EHBs that one emulation C300 Controller can communicate to.

One and only one pair of ThisHG and AddedHG.

Up to two RemoteHGs.

- Reserve the IP address of the HGs for future migration if you are planning the migration in a phased manner for the HGs with the RemoteHG relationships.
- When different LCNs are connected to the same physical Hiway they are usually attached to distinct Experion ESV-T clusters. The cluster, which has the EHB where the “This HG” relationship is established with a box emulation is the only one which can configure that emulation. In clusters where the EHB has a Remote HG relationship with a box emulation, the emulation can be viewed through TPN, but not through Experion. This TPN view becomes available after Hiway gateways(HG) on that LCN have been migrated to EHBs. In order to best manage the availability to view a box emulation from different LCNs, sites can stagger box migration as appropriate.
- Be aware that after migration, Universal Station connected to TPN has view to process in full. Also, some of the DCS maintenance function is available only on Experion stations and ESTs. If you plan to continue to use the Universal Station, the network must be adjusted according to these needs.

Attention

Refer to the Experion R431.1 PCT document for the capacity and sizing information when planning for replacing the Hiway boxes with LCN-connected C300 emulations.

3.1 About Hiway number, box address, and box assignment

The Hiway number and the box address are central to the scheme whereby the HG supports multiple gateways connected to the same physical Hiway. This scheme is expressed in terms of the Box Assignment relationship (BOXASSN parameter of the Hiway Box point) between the HG and the box. The relationship can have one of the three possible states as follows.

ThisHG

The HG where the BOXASSN is configured is the primary owner of the box on the physical Hiway. It has privileges to read parameters, write parameters, load box and slot configurations, collect notification reports, and close supervisory cascades (full control) from the AM.

AddedHG

The HG where BOXASSN is configured is aware of the box on the physical Hiway but has no data access privileges.

RemoteHG

The HG where the BOXASSN is configured is a remote (different LCN) owner of the box on the physical Hiway. It has privileges to read parameters, write parameters, and to load box and slot configuration. It does not have privileges to collect notification reports nor to close supervisory cascades from the AM.

The distinction between **ThisHG** and **AddedHG** exists to allow two different HGs, connected to the same physical Hiway and to the same LCN, to share the total data access load arising from the boxes on the Hiway. In this arrangement, each HG owns (has a **ThisHG** relationship with) a mutually exclusive set of boxes. Each HG views the boxes it does not own as **AddedHG** and knows only enough about them to stay out of the way when the partner HG does primary data access.

The distinction between **ThisHG** and **RemoteHG** exists to allow two different HGs, connected to the same physical Hiway and to different LCNs, to access data from the same box. The HG with the **ThisHG** relationship is the primary owner of the box. But the HG with the **RemoteHG** relationship can read and write data to slots within the same box. **RemoteHG** relationships can be used to support data access from a different process unit associated with a different LCN.

BOXASSN

The BOXASSN parameter also applies to box emulations running under an EHB. Its meaning is the same as for physical boxes running under an HG in almost all cases.

Following are some exceptions:

- While an LCN load operation can be performed within the ESV-T cluster where an EHB has a “This HG” relationship with the emulated box, the utility of such a load is curtailed. Configuration of the box emulation is accomplished through the procedure of Translate and Load, as described in “Translation of the HG configuration into standard Experion Control Builder configuration files” on page 81. This procedure requires Experion load from Control Builder.
- A load operation cannot be meaningfully performed from an ESV-T cluster where the EHBs have “Remote HG” relationships with the emulated box. The box emulation is unknown to the Experion side of the cluster so that no load from Control Builder can be performed.

3.2 Various system topologies

3.2.1 Topology 1: One LCN to one FTE

The following diagram displays a topology of a typical HG-based LCN network. This network includes one cluster.

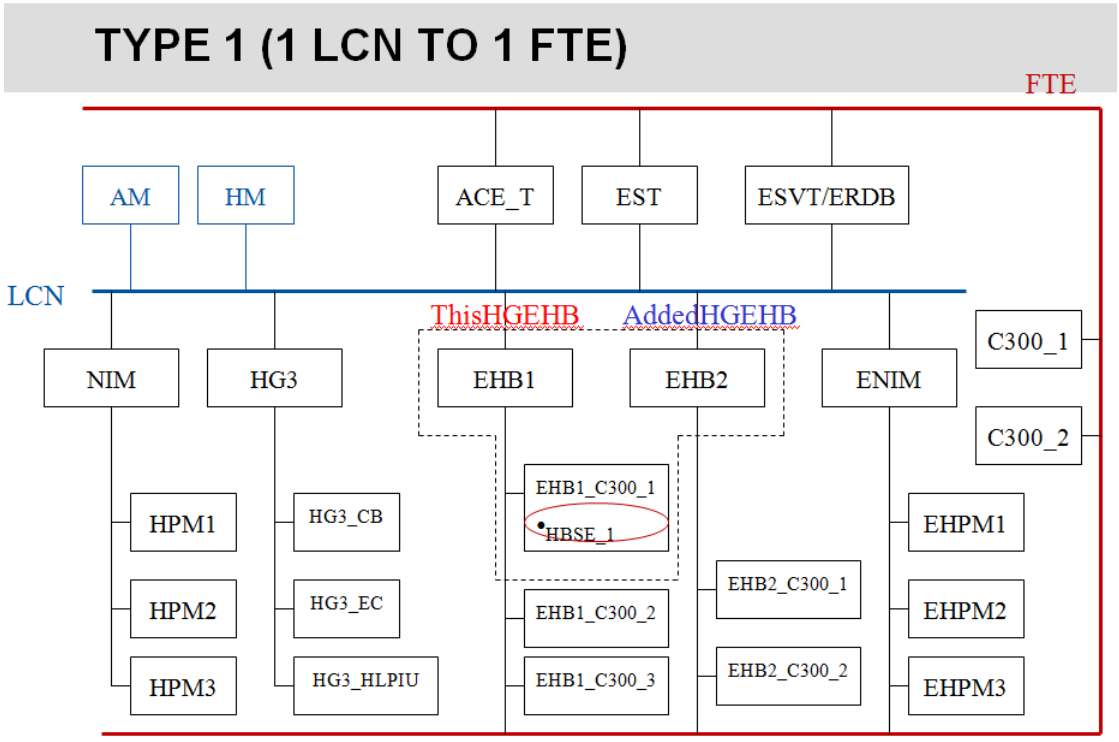


Figure 5: Topology of one LCN to one FTE

This network in its pure LCN form includes three HGs namely HG1, HG2, and HG3, of which HG1 and HG2 are on the same physical Hiway with a relationship of “ThisHG” and “AddedHG.” This LCN network also includes many HPMs connected through NIMs.

After migration/cut-over, the HG1 and HG2 are moved to EHB1 and EHB2 with the same relationship along with emulated boxes. One of the NIMs (shown on the right) is upgraded to EHPMs/ENIM combination. The network also includes C300_1 and C300_2 controllers which are included for new needs. EHPMs, C300_1, C300_2, and ACE-T all can exchange data under peer access. LCN nodes, AM, HM, ACE-T, ESR and ESVT can access the TPN data from all HPMs, EHPMs, physical and emulated boxes through TPN data access.

Attention

Honeywell strongly recommends that the write access to parameters in emulations from a non-emulation strategy must not be attempted. It must be accessed through the HG point.

There are 2 ways by which you can have non-emulated strategies to access emulated strategies:

- Access the HG points from the ACE_T node where the non-emulated strategies reside.
- Access HG points from local or peer CEE (where the non-emulated strategies reside) through peer server responder.

Attention

Honeywell strongly recommends that the read access to parameters in emulations from a non-emulation strategy must not be attempted. It must be accessed through the HG point.

There are 2 ways by which you can have non-emulated strategies to access emulated strategies:

- Access the HG points from the ACE_T node where the non-emulated strategies reside.
- Access HG points from local or peer CEE (where the non-emulated strategies reside) through peer server responder.

To the box emulation HBSE_1, EHB1 is the “ThisHG EHB”, and EHB2 is the “AddedHG EHB” EHB1, EHB2, and ENIM are migrated, and in the FTE network. HG3 and NIM are not migrated and remain in LCN network.

3.2.2 Topology 2: Two LCNs to one FTE with data access across clusters

The following topology diagram is a combination of two LCNs migrated from HG-NIM combination.

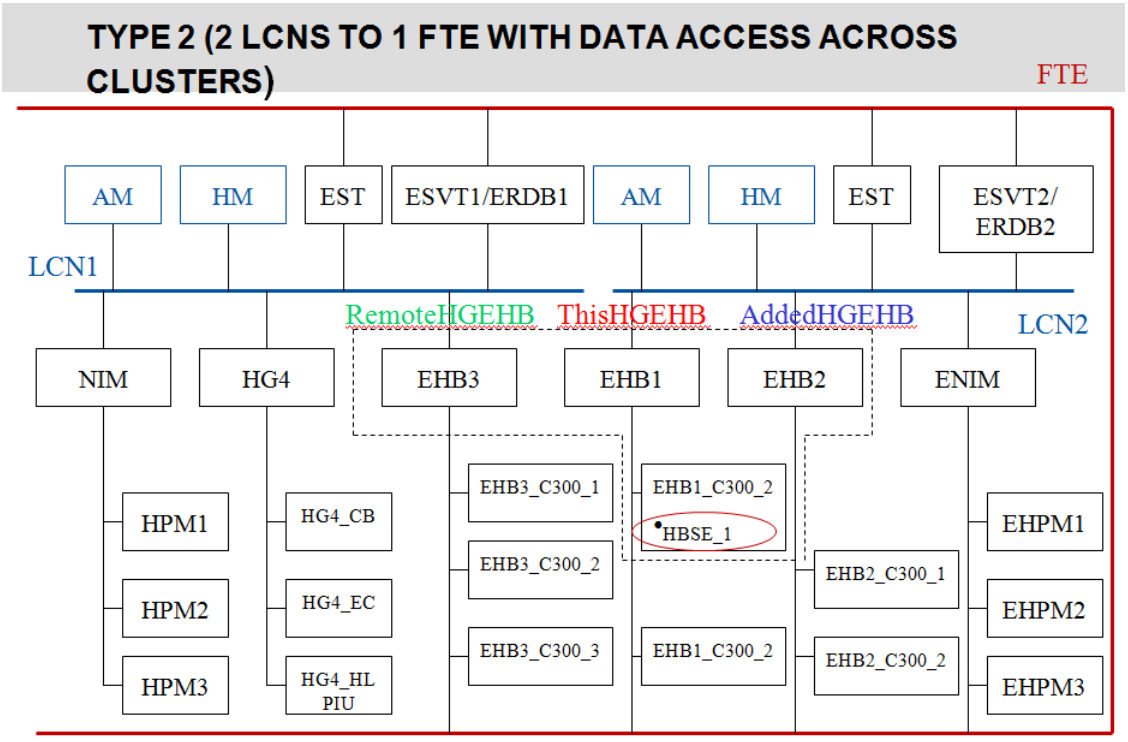


Figure 6: Topology of two LCNs to one FTE (with data access across clusters)

To the emulated controller HBSE_1, EHB1 is the “ThisHG EHB”, EHB2 is the “AddedHG EHB”, and EHB3 is the “RemoteHG EHB.”

3.2.3 Topology 3: Two LCNs to two FTEs with data access across FTEs

This following topology is of the network that has two LCNs and an equivalent to two FTEs. An L2.5 router is used to bridge the Experion cluster.

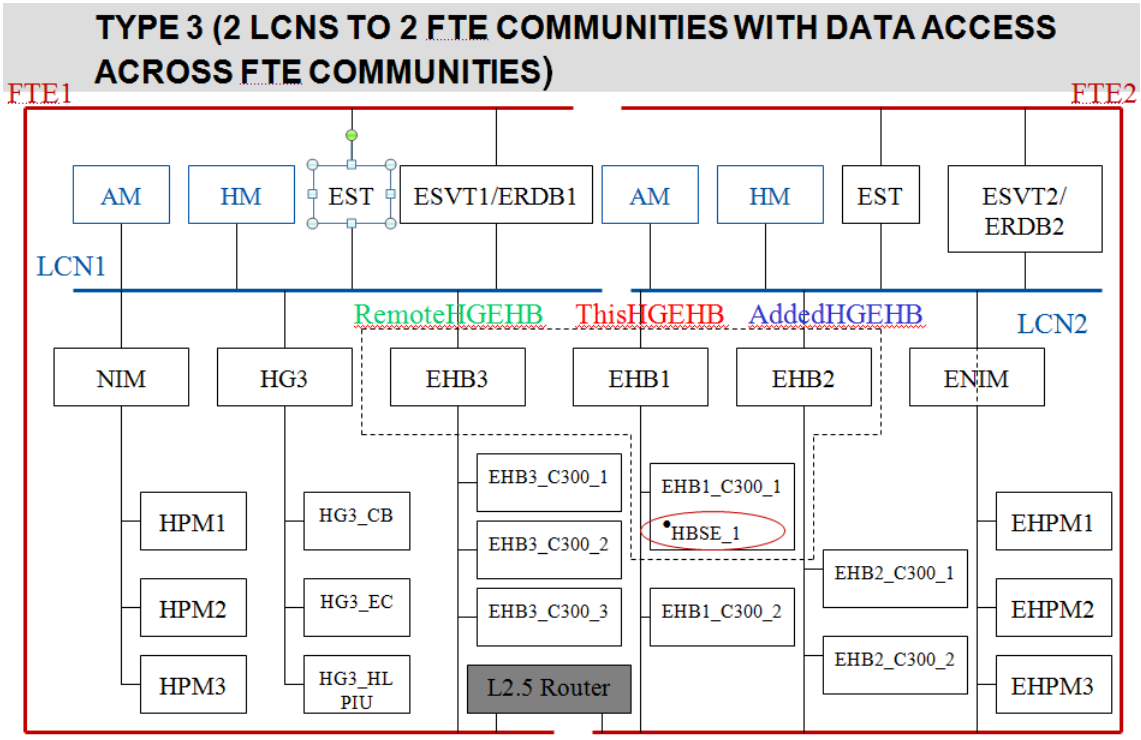


Figure 7: Topology of two LCNs to two FTEs with data access across FTEs

To the emulated controller HBSE_1, EHB1 is the “ThisHG EHB”, EHB2 is the “AddedHG EHB”, and EHB3 is the “RemoteHG EHB”. The communication between HBSE_1 and and EHB3 (the RemoteHG EHB) across FTE communities is through L2.5 router.

This topology splits two LCNs to two different FTE communities. This type of topology may be suitable when there are large number of nodes, and they cannot fit into one FTE community, or the customer wants to segment the network in order to limit “Scale of Loss” when there are network failures.

3.2.4 Topology 4: One LCN to two clusters in one FTE

This following topology is of the network that has one LCN to two clusters in one FTE. An L2.5 router is used to bridge the Experion cluster.

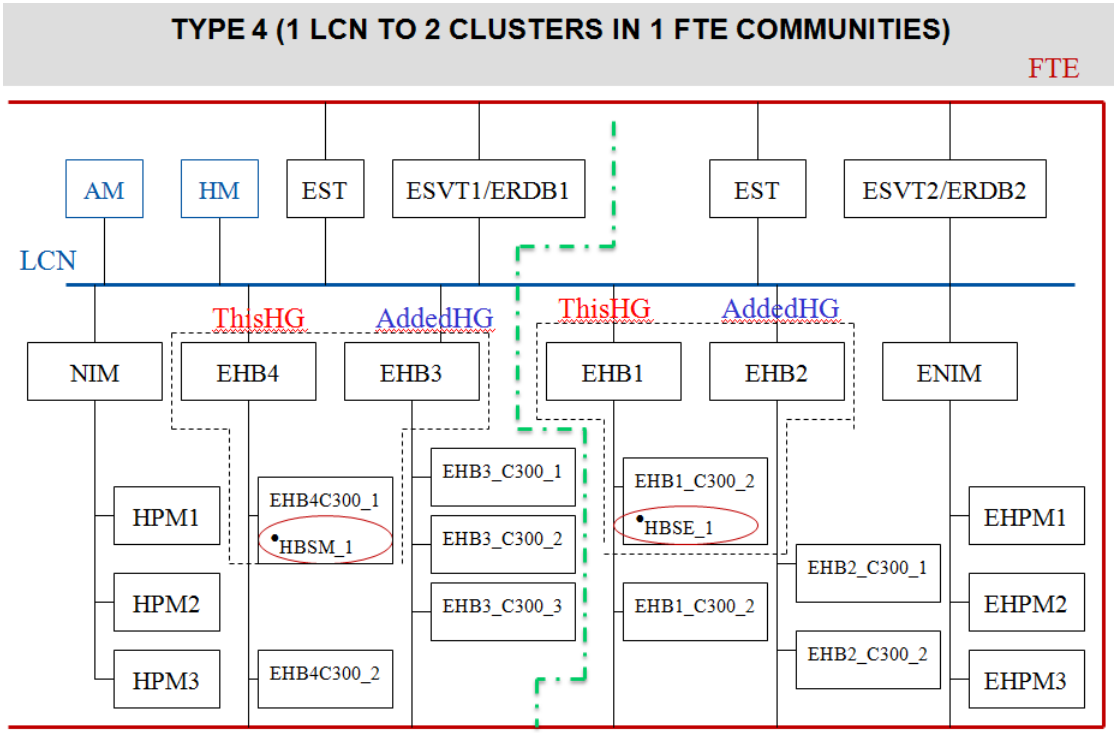


Figure 8: Topology of one LCN to two clusters in one FTE

This topology splits one LCN to two different Experion clusters in a single FTE community. This type of topology is suitable when there are large number of controllers and they cannot fit into one Experion cluster.

Attention

In this type of topology, “ThisHG” and “AddedHG” EHB pair must be in the same cluster.

3.2.5 Topology 5: One LCNs to two FTEs with data access across FTEs

This following topology is of the network that has one LCN and an equivalent to two FTEs. An L2.5 router is used to bridge the Experion cluster.

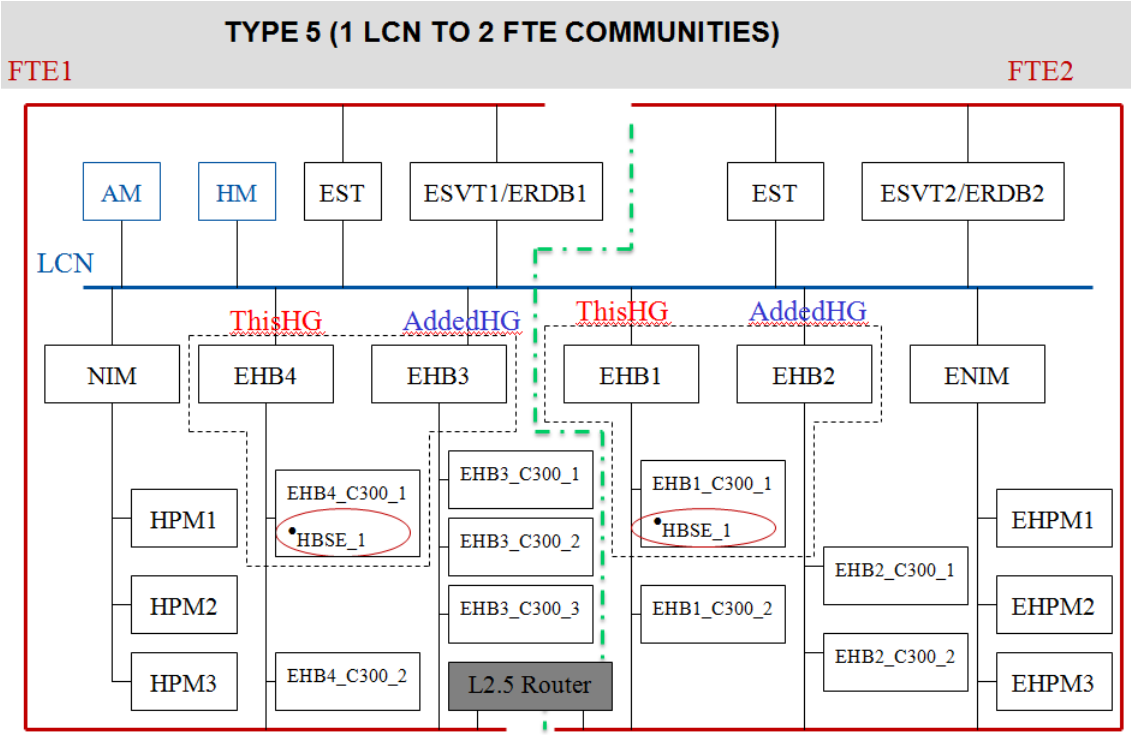


Figure 9: Topology of one LCN to two FTEs with data access across FTEs

This topology splits one LCN to two different FTE communities. This type of topology may be suitable when there are large number of controllers and FTE nodes, and they cannot fit into one FTE community, or the user wants to segment the network in order to limit “Scale of Loss” when there are network failures.

Attention

In this type of topology, “ThisHG” and “AddedHG” EHB pair must be in the same cluster.

3.3 Concept of emulation

The Hiway box/algorithm slot configurations are translated into standard Experion Control Builder configuration files using the HSE Creator Tool. These files are then imported into the Experion engineering repository database from Control Builder to create Control Module configurations, which emulate the functionality of Hiway slots. Emulated boxes run in the C300 controller using CEE block strategies, which are functional equivalents of the legacy algorithms supplied by the Hiway box.

The emulations supply parameters, which are linked to the HG point in the same way as the original box. Behavior of the emulations in terms of control, parameter access and alarms closely matches that of the original algorithms.

The control objects, which are part of the emulation of HG boxes are represented in the following figure.

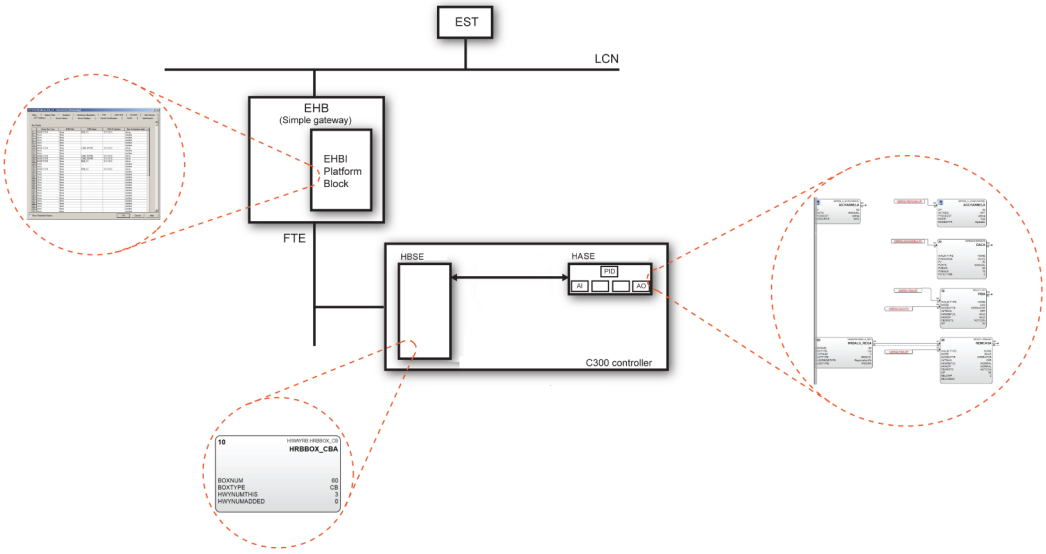


Figure 10: Control objects that are part of emulations

EHBI is the interface board, which is used to establish connectivity between the modified HG personality and the FTE network.

For example, the regulatory CB point, which is running PID algorithm is translated to its equivalent control strategy. It includes AI, DATACQ, PID, AO, which are native function blocks of Experion. This strategy is linked through the emulation blocks, a Slot HRB, which is analogous to a slot configured in a box, and a Box HRB which is analogous to box configured in a Hiway.

3.4 Functional differences between physical and emulated Hiway slots

The Hiway Responder Blocks are part of the box/algorithm emulations and function as an interface for data exchange between the EHB and the CEE native blocks. There might be some differences in the functionality when an HG point is over emulation as compared to an HG point over a physical Hiway slot.

For information about the differences in the functionality that you might encounter between the physical and the emulated Hiway slots, refer to the *Hiway Slot Emulation Creator User Guide*.

3.4.1 Tuning differences

One difference between C300 controllers and Hiway controllers such as CB and EC is that C300 controllers use serial data links to communicate with IO whereas CBs and ECs have IO directly connected to the controller CPU. This means that the C300 has somewhat larger delay in its IO communication than CB or EC. This timing difference has no impact on the majority of loop configurations but for very fast loops, it is possible that retuning may be required after migrating from a Hiway box to a C300 emulation.

3.5 Accessing parameters in emulations from non-emulation strategies

Emulation C300 can read from and write to a control strategy in a regular C300. A write access from a peer C300 to emulation C300 is not recommended because it might cause value inconsistency between LCN and the emulation for certain parameters.

Attention

Honeywell strongly recommends that the write access to parameters in emulations from a non-emulation strategy should not be attempted. It must be accessed through the HG point.

There are 2 ways you can have non-emulated strategies to access emulated strategies:

- Access the HG points from the ACE_T node where the non-emulated strategies reside.
- Access HG points from local or peer CEE (where the non-emulated strategies reside) through peer server responder.

Attention

Honeywell strongly recommends that the read access to parameters in emulations from a non-emulation strategy should not be attempted. It must be accessed through the HG point.

There are 2 ways you can have non-emulated strategies to access emulated strategies:

- Access the HG points from the ACE_T node where the non-emulated strategies reside.
- Access HG points from local or peer CEE (where the non-emulated strategies reside) through peer server responder.

4 Setting up the EHB

The EHB solution enables you to migrate your legacy Hiway boxes to the Experion DCS without having to eliminate the LCN. At a high-level, this can be accomplished by enhancing the HG to support connectivity to Experion through the FTE and by emulating the Hiway control configuration in C300.

This chapter provides the high-level tasks for setting up EHB. This version of the migration solution supports off-process and on-process migration.

The migration procedure includes the following high-level tasks. These tasks can be performed as separate operations.

- "Upgrading HG to EHB"
- "Loading EHB-specific C300 application image"
- "Configuring platform blocks for Hiway Emulation"
- "Translating Hiway box and slot configuration"
- "Replacing physical Hiway boxes with C300-resident emulations"

Prerequisites

Ensure that you review the tasks outlined in the following table while you plan for the migration. This table provides information about the tasks that must be performed before you migrate the HG nodes to EHB.

Task	Description	Reference
Planning for the migration	Before migrating the HG nodes to EHB, ensure that you refer to the relevant documents to plan for the migration.	Refer to "Planning for replacing the Hiway boxes with the LCN-connected C300 emulations" Refer to the EHB Specifications. Refer to the Fault Tolerant Ethernet Overview and Implementation Guide for information about FTE implementation. Refer to the C300 Controller User's guide for information about planning for controllers.
Migrate all the nodes to Experion R431.1 and TPN 685.3.	To replace the HG boxes with LCN-connected Experion C300–based emulations, you must migrate all the nodes to Experion R431.1 and TPN 685.3 release.	Refer to the following: • Experion Migration documents • TPN R685 *Customer Release Guide*
Save the HG with the Checkpoint	Save or take a backup of the existing HG with Checkpoint.	Refer to the TPN documentation set.

Task	Description	Reference
Set the required options in the Hiway configuration	For each CB/EC box, select the Load Destination as HG. Set the **Change Detection (CHNGFLAG)** option to DETECT and the **Box Trending** option to NOTREND in CB boxes. For more information, see the HG to EHB Upgrade Kit Instructions.	Refer to the following: • TPN documentation set • *HG to EHB Upgrade Kit Instructions*
Create the required Exception Builder (.EB) files	Before starting the migration, ensure that you create the required .EB files for the boxes that are to be migrated.	Refer to the TPN documentation set.
Convert the HG point configuration into the C300 based emulations.	The HSE Creator Tool facilitates the translation of Hiway box and slot configuration into standard Experoin Control Builder configuration files (cnf.xml files). These files can then be imported into the Experion engineering repository database from the Control Builder to create Control Module configuration, which emulate the functionality of Hiway slots.	Refer to the *Hiway Slot Emulation Creator User Guide*.
Configure the EHB platform block in the Control Builder.	You can configure the EHB platform block in Control Builder before the migration, and load the block after the migration.	Refer to “Configuring the EHB platform block”.

Upgrading HG to EHB

The migration process supports the hardware and software upgrade of redundant and non-redundant HG nodes to EHB. The procedure to upgrade HG to EHB is discussed in the *HG to EHB Upgrade Kit Instructions*.

The following table provides information about the various migration scenarios.

Note
The Upgrade procedure for simple gateway and junction gateway configurations vary. Therefore, ensure that you review the appropriate sections in the *HG to EHB Upgrade Kit Instructions*.

HG to EHB migration scenarios

HG Node type	Configuration type

Non-redundant nodes	Simple gateway configuration Junction gateway configuration
Redundant nodes	Simple gateway configuration Junction gateway configuration

Loading EHB-specific C300 application image

An application image to run Hiway emulations in a C300 controller is introduced. This application image is different from the application image normally used with a C300 controller. To run emulations in C300, the EHB-specific C300 firmware must be loaded.

For more information about loading EHB-specific C300 controller firmware, refer to “Loading EHB-specific C300 Controller firmware” on page 34.

For more information about the EHB-specific C300 image, refer to the *Control Builder Components Reference*.

Configuring platform blocks for Hiway Emulation

When migrating from HG to EHB, configuration data must be supplied to the platform block of the EHBI card and to the platform block of the CEE. This data allows FTE communication relationships to be formed while maintaining the view of names and addresses that already exist on the LCN.

For more information, refer to the following sections:

- Configuring the EHB in the *Control Building User’s Guide*
- “Configuring the EHB platform block” on page 38
- “Configuring the CEEC300 ” on page 41

Translating Hiway box and slot configuration

The HSE Creator tool is used for translating Hiway box and slot configuration into standard Experion Control Builder configuration files (cnf.xml files). These files are then imported into ERDB to create Control Module configuration, which emulate the functionality of Hiway slots. These emulations (HBSE and HASE) are loaded to the Experion C300 Controller. Hiway Responder Blocks are automatically instantiated in Control Modules when Hiway slot emulations are created by the HSE Creator Tool. However, you must provide details of the parameters that are not automatically configured by the HSE Creator Tool.

For more information, refer to the following:

- *Hiway Slot Emulation Creator User Guide*
- “Configuring the Box HRB” on page 43

Replacing physical Hiway boxes with C300-resident emulations

The procedure of replacing Hiway boxes with C300-resident emulations is done as a separate operation. This can be performed in one of the following ways:

- Shutting down Hiway boxes and re-routing field cables from the legacy boxes to the C300 controllers while control is off-process.
- Performing a box-by-box hot cutover procedure in which a Cutover Management display is used to operate through the Experion data access while field wiring is moved.

For more information, refer to the following:

- “Performing a Cold cutover” on page 91
- “Performing a Hot cutover” on page 93

4.1 Converting EHB from Junction Gateway to Simple Gateway

An EHB interfacing to both a physical Hiway and to FTE resident Hiway box emulations can be used in Junction Gateway mode for an indefinite period of time based on site needs. When a site decides that it is ready to decommission the physical Hiway it will convert the Junction Gateway into a Simple Gateway by removing the DHI card.

Refer to the *HG to EHB Upgrade Kit Instructions* for converting EHB from Junction Gateway to Simple Gateway.

4.2 Installing the EHBI firmware

Installing the EHBI firmware is performed from Experion. CTool provides options to install the EHBI firmware. Initially, you must upgrade the firmware personality from ENIM to EHB.

To initially install the EHBI firmware

1. Click Configuration studio > Control Strategy, Series C - Controller and I/O => Maintain Control System Firmware to start the Series C Firmware Load Tool (CTool).

   The CTool window appears.
2. Select the row where the **Type** is ENIM.
3. Right-click to open the firmware load shortcut menu.
4. Select **Load** > **Control File**.

   A window to select the control file appears.
5. Navigate to *\Honeywell\Experion PKS\Engineering Tools\system\Firmware\EHB*, select the enim2ehb.lcf file, and click **Open**.

   ENIM is shutdown and the EHB boot image begins to load. A progress bar indicates the status of the loading process. After the boot image is loaded completely, the value of **Type** changes from ENIM to EHB, and the appropriate boot version is displayed.
6. Click **LoadFW** to load the App image.

   After the App image is loaded completely, the appropriate App version is displayed. The EHBI firmware is installed.

To upgrade and load the firmware to the latest version

1. Navigate to *\Honeywell\Experion PKS\Engineering Tools\system\bin* and start the Series C Firmware Load Tool (CTool).

   The CTool window appears.
2. Select the EHBI (where the **Type** is EHB) for which you want to load the latest version of the firmware.

   Before starting the firmware load of EHBI, it is recommended to shut down the EHB, which uses the EHBI on the LCN side.
3. Click **LoadFW**.

   The progress bar indicates the status of the firmware upgrade.

   After the upgrade is complete, the Boot and the App versions are displayed in green to indicate that they are the latest versions.

4.3 Loading EHB-specific C300 Controller firmware

The EHB-specific C300 image runs on the C300 hardware.You can identify the kind of application image that is running in a C300 hardware set by using a new parameter, APPIMAGETYPE – Application Image Type, defined on the CEE platform block.

The parameter, APPIMAGETYPE (Application Image Type,) distinguishes the type of application image running in the C300 and indicates whether the image supports C300 functions with EHB emulation enablers (C300_HwyEmul) or C300 functions without EHB emulation enablers (C300).

For more information about the EHB-specific C300 image, refer to the Control Builder Components Reference.

To use C300 with EHB emulation enablers, you must perform the following tasks:

1. Load the appropriate application image. Refer to the procedure, **To load EHB-specific C300 Controller firmware**.
2. After loading the application image, you must set the APPIMAGETYPE on the CEE platform block to be consistent with the loaded image. For more information about the parameter, APPIMAGETYPE, refer to the Control Builder Parameter Reference.

   For more information about setting the APPIMAGETYPE on the CEE platform block, refer to the Configure CEEC300 block in the *C300 Controller User's Guide*

The Series C Firmware Load Tool (CTool) utility is used for loading/upgrading firmware in Series C control hardware components. Complete the following procedure to load the EHB-specific C300 controller firmware.

To load EHB-specific C300 Controller firmware

1 On the Configuration Studio, click **Maintain Control System Firmware** under Series C Modules.
The CTool window appears.

2 Select the C300 controller and right-click to open the firmware load shortcut menu.

3 Select **Load** > **Control File**.
The Image Option dialog appears.

4 Select **EHB** and click **OK** to load the EHB-specific C300 firmware.
Wait for the load operation to complete.

5 Configuring Platform Blocks for Hiway Emulation

When the Hiway boxes are replaced with the LCN-connected C300 emulations, the LCN view of the slots in those boxes, as provided by the HG points resident in the EHB, is unchanged from the view provided by the original HG. This means that the following items related to data addressing remain unchanged.

- Tag name of the HG box point
- Tag names of the Hiway box points
- Tag names of the process points
- Address of the HG on LCN
- Hiway number of the HG on LCN
- Box Address on the Hiway
- Assignment of the points to the Hiway slots and subslots
- Names and data types of all parameters of the HG points

Attention

Replacing the Hiway slots with the Experion emulations entails replacing the Hiway communications with Fault Tolerant Ethernet (FTE) communications. FTE is based on different principles of network addressing and topology. For some of the above items, you must carefully perform the system configuration to ensure that no contradictions arise; of particular interest are the Hiway Number of the HG on the LCN and the box address on the Hiway.

5.1 Accessing the Experion Control Builder configuration forms

Parameters related to the configuration of the EHBs and the emulation C300s are accessed through the Experion Control Builder forms.

- EHB platform block configuration form - Click **File**>**New**>**Gateways**>**EHB - Experion Hiway Bridge**
- C300 CEE platform block configuration form - Click **File**>**New**>**Controllers**>**C300 Controller (2 I/O Links)**
- HRB box configuration form - Most of the HRB configuration parameters are filled out automatically by the HSE Creator Tool. However, there are a few parameters which must be manually configured by the application engineer.

5.2 Need for completeness of configuration

When migrating from HG to EHB, configuration data must be supplied to the platform block of the EHBI card, to the platform block of the CEE, and to the Box Hiway Responder Block of the box emulation module. This data allows FTE communication relationships to be formed while maintaining the view of names and addresses that already exist on the LCN.

When migrating from HG to EHB, you must complete the configuration of the following blocks in the sequence in which they are listed below. The configuration data allows FTE communication relationships to be formed while maintaining the view of names and addresses that already exist on the LCN.

1. EHB platform block
2. CEE C300 block
3. Parameters of the HRB block of the box emulation module which are not automatically configured by the HSE Creator Tool. This consists of any IP addresses of the remote EHBs which replace the remote HGs.

Each EHB replaces exactly one HG on an LCN. Not more than one LCN can be connected to an ESVT cluster. EHB platform block must be configured and loaded before CEEs which communicate with them. CEE platform block must be configured and loaded before the Box HRBs which they host.

Certain configuration that would have been illegal when using the physical Hiway are also illegal when using the Hiway emulation on FTE. For example, two boxes configured on the same logical Hiway cannot have the same Hiway address. Such an error is unlikely to occur when moving to the EHB since box addresses on the emulated Hiway duplicate those of the original Hiway. However, other configuration errors are possible with FTE-based Hiway emulation even though they were not possible when using the physical Hiway.

The following example summarizes the impact of entering duplicate box emulation address within a single C300 or a single cluster.

Duplicate box emulation address within a single C300 or a single cluster

Assume that a legacy system consisting of two LCNs, LCN1 and LCN2, is to be migrated to EHBs. The configuration of this system is as follows:

- LCN1 has an HG called HG1. LCN2 has an HG called HG2. HG1 and HG2 are connected to different physical Hiways. The physical Hiway connected to HG1 has a box at address 5. The physical Hiway connected to HG2 has a different box at address 5.
- LCN1 and HG1 designate their physical Hiway with an LCN-local, logical number. This is the Logical Hiway Number. The Logical Hiway Number is unique within the scope of the LCN but not necessarily unique across all LCNs at the site. For LCN1 and HG1, the Logical Hiway Number is 1.
- LCN2 and HG2 designate their physical Hiway with a Logical Hiway Number. The Logical Hiway Number is unique within the scope of the LCN but not necessarily unique across all LCNs at the site. For LCN2 and HG2, the Logical Hiway Number is 1.

Examples of possible incorrect configuration

- An engineer attempts to configure the two different emulated boxes with an address 5 in the same C300 and CEE. In such a scenario, the impact upon FTE communication would be unpredictable. There could be a loss of communication to one or both the boxes, resulting in a loss of view and supervisory control.
- An engineer attempts to configure two different emulated boxes with an address 5 in two different C300s, within the same Experion cluster, and with the same Logical Hiway Number of 1. Such a configuration is contradictory; since, in the original system the two boxes resided on different physical Hiways and different LCNs. Each of the box 5 emulations have to be configured in different Experion clusters. The mistake of configuring them within the same cluster, even if loaded to different C300s, could result in a loss of view and supervisory control.

5.3 Configuring the EHB platform block

When configuring two EHBs in an Experion Server cluster, which are to be connected to the same emulated physical Hiway, the first configured EHB (called the defining EHB) defines the physical Hiway emulation. The second EHB acquires most of its configuration from the defining EHB.

The following figure displays the EHB platform block configuration form for a defining EHB.

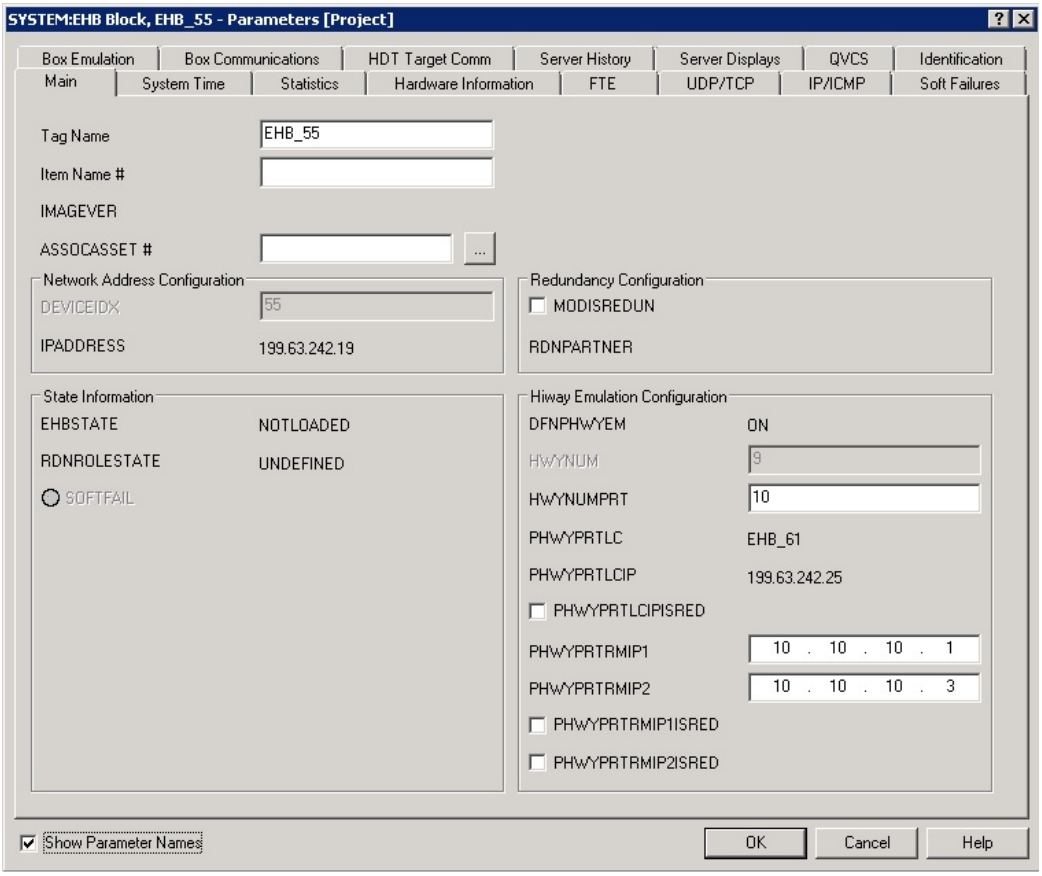


Figure 11: EHB platform block configuration form for a defining EHB

Hiway emulation configuration is entered under Hiway Emulation Configuration. DFNPHWYEM defaults to On within the form. When you configures the value of the key configuration parameter, HWYNUM, DFNPHWYEM either remains On or gets automatically set to Off.

If the value entered for HWYNUM is unique across all the EHBs so far defined within the ESVT cluster, then DFNPHWYEM remains On. If HWYNUM is detected to exist as the configured value of HWYNUMPRT on some other EHB, then DFNPHWYEM is automatically set to Off.

The EHB which has DFNPHWYEM set to On defines HWYNUM as a key configuration parameter. It also defines all other parameters needed to completely specify the emulation of a physical Hiway within the ESVT cluster. Following are the other parameters on the form:

Parameter name	Description
HWYNUM	Indicates the EHBs, the CEEs, and the Box HRBs, which are associated with the same Hiway emulation under an Experion Server cluster
HWYNUMPRT	This is a manually configured parameter, which indicates the logical Hiway number of the partner EHB which is connected to the same physical Hiway emulation and is in the same ESVT cluster.

Parameter name	Description
PHWYPRTLC	This is an automatically populated parameter. It displays the tag name of the partner EHB, if any.
PHWYPRTLCIP	This is an automatically populated parameter. It displays the IP address of the partner EHB, if any.
• PHWYPRTRMIP1 • PHWYPRTRMIP2	These are a manually configured parameters. It indicates IP addresses of EHBs in different ESVT clusters. These remote EHBs can do parameter access to Hiway box emulations defined in the local cluster. Remote IP addresses cannot be specified by device index since the base IP address is not known within the local ESVT cluster **Note** PHWYPRTRMIP1 and PHWYPRTRMIP2 defined on the EHB which has DFNHYNUM set to ON are different and constitute unique values within the ESVT cluster.
• PHWYPRTLCIPISRED	Selecting PHWYPRTLCIPISRED (Local Partner is Redundant) indicates that the local partner is redundant.
• PHWYPRTRMIP1ISRED	Selecting PHWYPRTRMIP1ISRED (Remote Partner 1 is Redundant) indicates that the remote partner 1 is redundant.
• PHWYPRTRMIP2ISRED	Selecting PHWYPRTRMIP2ISRED (Remote Partner 2 is Redundant) indicates that the remote partner 2 is redundant.

- If the value of HWYNUM has not been already defined within the configuration of a partner EHB, the DFNPHWYEM remains ON after the EHB configuration is saved.
- If the value of HWYNUM is detected as already defined within the configuration of a partner EHB, the DFNPHWYEM is automatically set to OFF.

Note
Parameters HWYNUM and HWYNUMPRT defined on the EHB which has DFNPHWYEM set to ON are different and constitute unique values within the ESVT cluster.

Note
Parameters PHWYPRTLC, HWYNUMPRT, PHWYPRTRMIP1, and PHWYPRTRMIP2 may only be configured on the partner EHB which has DFNHWY set to ON.

When the second EHB is configured, it is recommended that its key configuration parameter, HWYNUM, be configured first. When that is done, the Control Builder detects the other EHB which has a matching value in its HWYNUMPRT parameter and after it is detected, the EHB sets the DFNPHWYEM to OFF. You can define two EHBs per Hiway within an ESVT cluster, which connects to the same emulated Hiway. These can be considered as partner EHBs. Only one of the two EHBs in the ESVT cluster may have DFNHWYEM set to On.

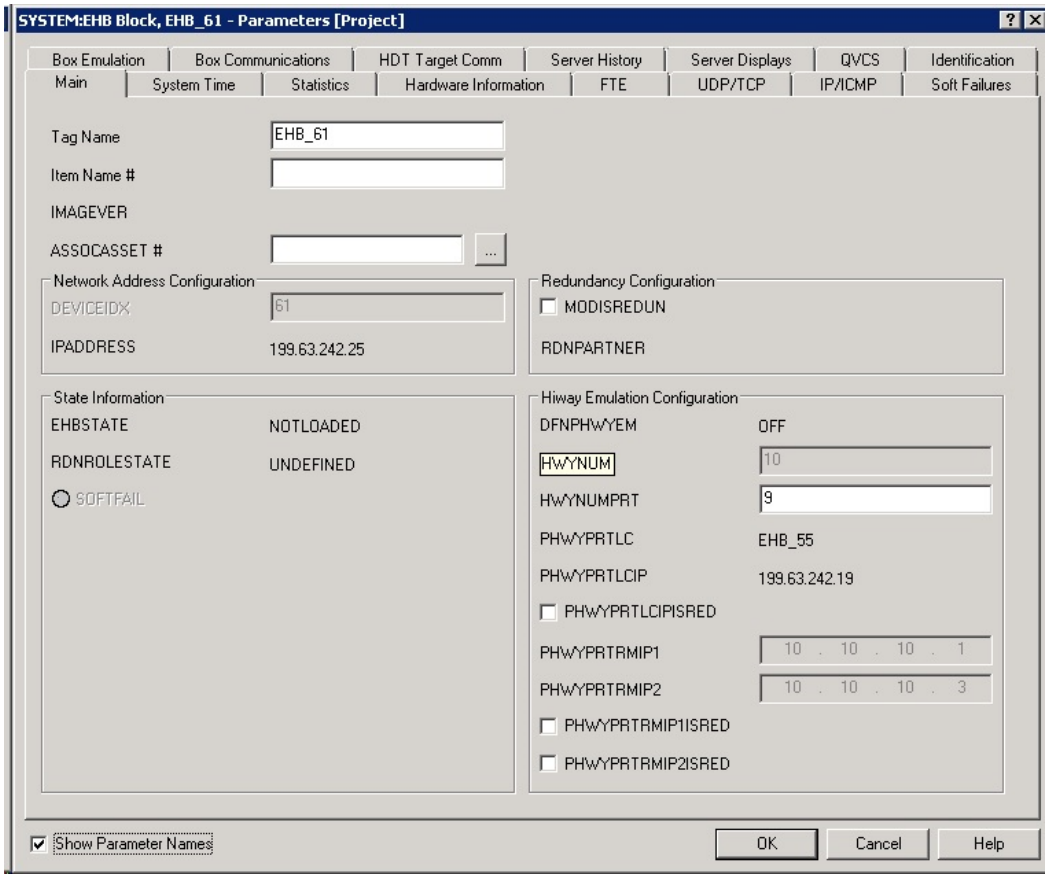


Figure 12: EHB platform block configuration form for a non-defining EHB

Other parameters of the EHB emulation configuration are automatically populated when the defining partner EHB is identified by configuration of HWYNUM. The parameters include the following:

- HWYNUMPRT
- PHWYPRTLC
- PHWYPRTLCIP
- PHWYPRTRMIP1, PHWYPRTRMIP2

Note

For the partner EHB which has DFNHWY set to OFF, HWYNUM may be configured; but it must be configured to match HWYNUMPRT of the EHB which has DFNHWY set to ON.

5.4 Configuring the CEEC300

The following figure displays the EHB Communications tab of the CEEC300 configuration form when the Show Parameter Names is not selected.

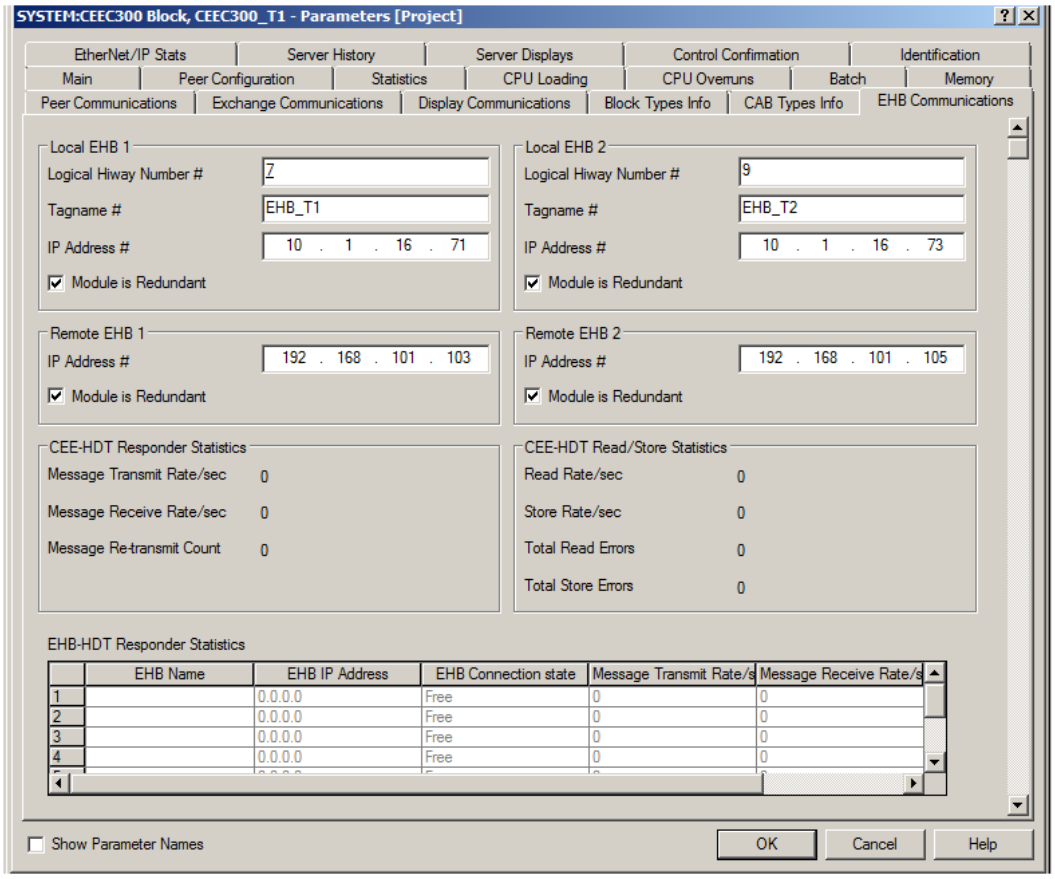


Figure 13: CEEC300 configuration form - EHB Communications tab

On this tab, you have to only configure the (Logical Hiway Number) HWYNUM1.

Note
EHBLC1ISRED and EHBLC2ISRED are used to indicate whether the Local EHB modules are redundant.
EHBRM1ISRED and EHBRM2ISRED is used to indicate whether the Local EHB modules are redundant.

Configuring the HWYNUM1 allows the EHB which defines characteristics of the emulated physical Hiway to be identified according to the following criterion.

- EHB.HWYNUM = HWYNUM1

HWYNUM1 of a CEE must be configured to match the HWYNUM parameter of an EHB which has DFNHWY set to On. This EHB is the “first partner” of the CEE.

HWYNUM1 must indicate an EHB which has DFNPHWYEM set to On. After the defining EHB is identified, all remaining configuration is automatically populated.

In addition, all configuration parameters on this tab, which are related to Hiway emulation support the Load While Active feature. This featureallows for modifying the parameter values and reloading them without setting the CEE to IDLE.

Tip
You can identify the active loadable parameters with the # symbol against the parameter name.

Note

You cannot change the elements of Hiway emulation configuration within CEEs if the CEE contains Box HRBs which use that configuration. In such scenarios, to make configuration changes to the CEE, you must delete the Box HRB.

5.5 Configuring the Box HRB

The HSE Creator Tool is used to generate the emulations sets most of the parameter values of the the box HRBs.

The following figure displays the Main page of the CB box HRB.

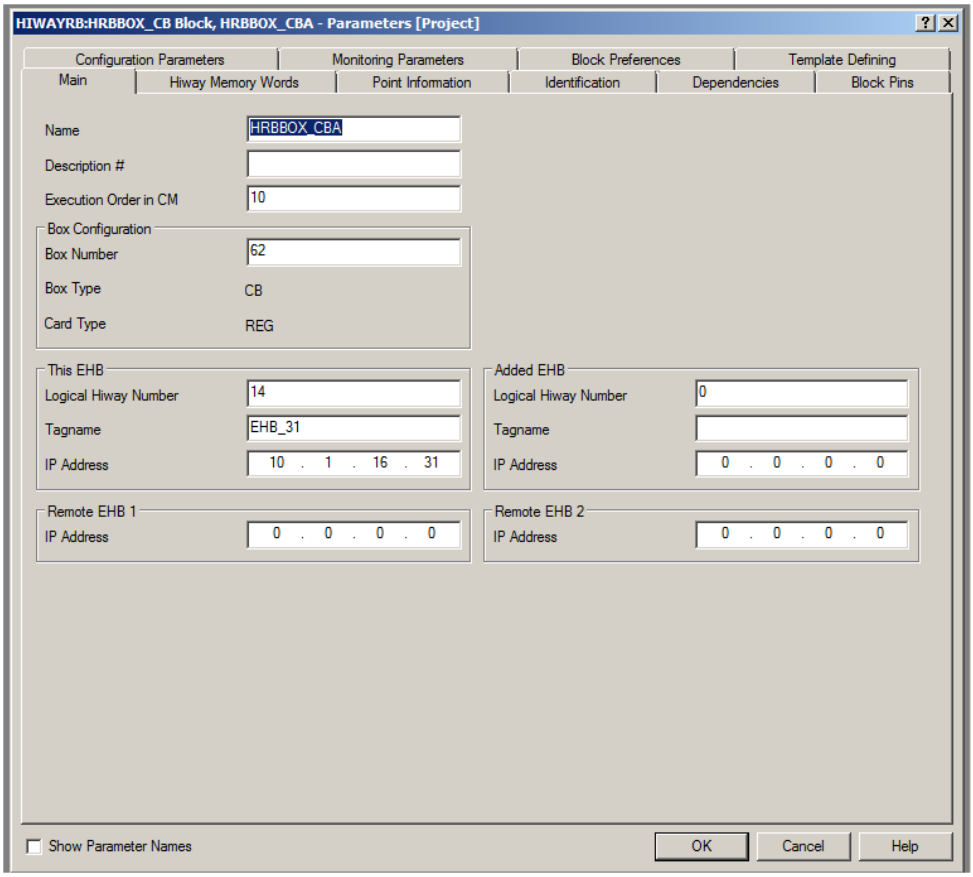


Figure 14: Box HRB configuration form

The following figure displays the Main page of the EC box HRB.

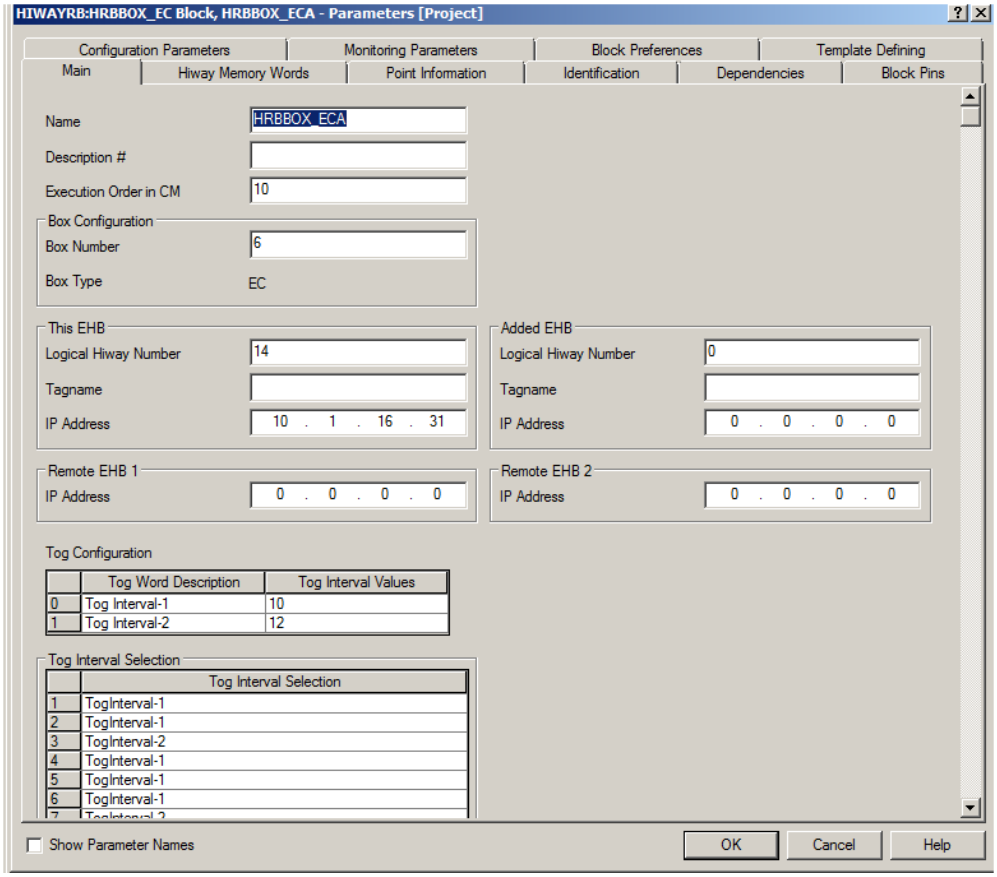


Figure 15: EC Box HRB configuration form

HWYUMTHIS - This parameter specifies the logical Hiway number of the EHB with which the Box emulation has a “ThisHG” relationship. HWYNUMTHIS acts as the key configuration parameter of Box HRBs. Once it is configured, most other parameters are automatically populated. HWYNUMTHIS can be configured manually but this will almost never be done as it is configured automatically by the HSE Creator Tool.

After the HWYNUMTHIS is specified, the following fields on the Main page of the box HRB configuration form are automatically populated.

- Tag name of the “ThisEHB” (EHBTHIS)
- IP Address of the “ThisEHB” (EHBTHISIP)
- Logical Hiway Number of the “AddedEHB” (HWYNUMADDED)
- Tag name of the “AddedEHB” (EHBADDED)
- IP Address of the “AddedEHB” (EHBADDEDIP)

You can modify the following parameters manually.

- HWYUMTHIS (Logical Hiway Number) - Specify the logical Hiway number of the EHB with which the Box emulation has a “This HG” relationship.

  HWYNUMTHIS must either match the HWYNUM1 or the HWYNUM2 of the parent CEE.
- EHBRMIP1, EHBRMIP2 (IP addresses of the Remote EHBs) - These two parameters are not automaticallly determined by the value of HWYNUMTHIS and must be manually specified if “RemoteEHBs” are part of the configuration. The IP address values specify up to two EHBs with which the Box emulation can have a remote communication relationship. When either the EHBRMIP1 or the EHBRMIP2 is configured to a non-null value, it must match either the EHBRMIP1 or the EHBRMIP2 configuration of the parent CEE platform block.

Each Box HRB may be defined in only one ESVT cluster. The cluster of definition corresponds to the one of the LCN whose HG has the ThisHG relationship with the emulated box.

BOXNUM is a configurable parameter and the value of the BOXNUM parameter must be unique and must represent the Hiway address of the box that the emulation is replacing. The value of BOXNUM must be unique on the emulation of the physical Hiway which is defined by the first partner EHB of the CEE (which is the parent of the Box HRB.)

5.6 Example of a sample configuration

Assume that you want to replace the legacy Hiway configuration with an emulation that has the following characteristics.

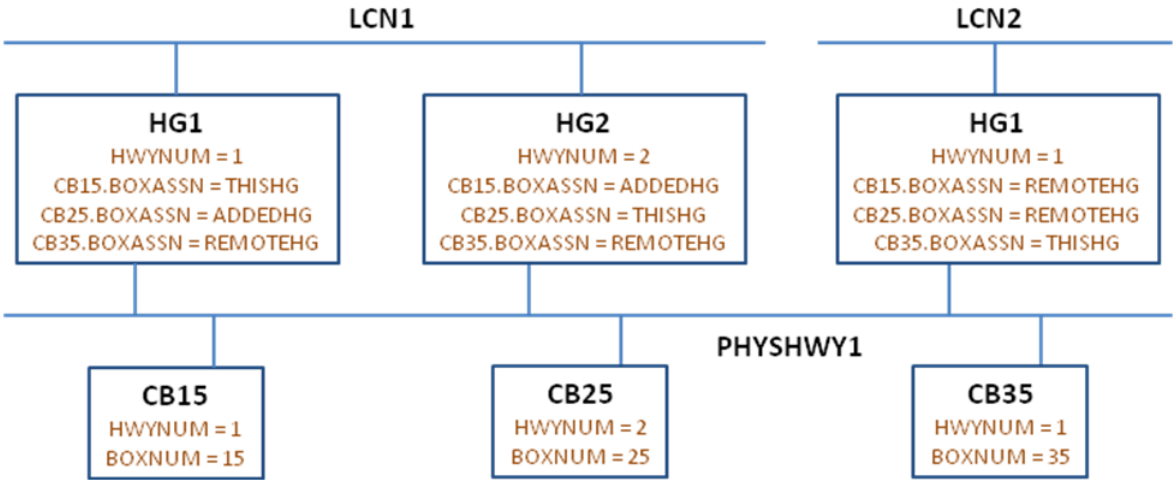


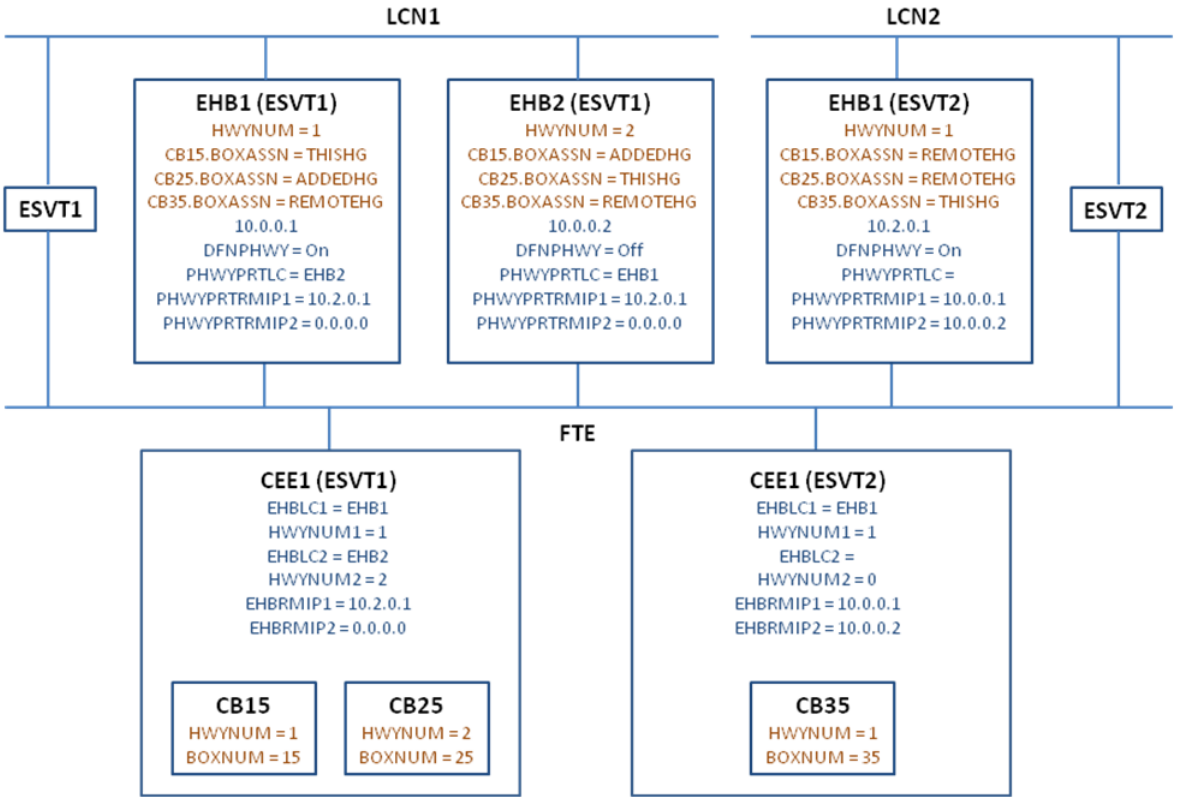
Figure 16: Illustration of a sample Hiway configuration

- A physical Hiway, here called “PHYSHWY1”, is connected to LCN1 and LCN2. This name designates the coaxial cable that provides communication connectivity among all the boxes that exist on the Hiway. The name does not exist in any LCN or Hiway configuration, though it may exist within the site documentation.
- LCN1 has HG1 and HG2, both connected to PHYSHWY1. HG1 identifies PHYSHWY1 under the LCN-local logical identification of HWYNUM = 1. HG2 identifies PHYSHWY1 under the LCN-local logical identification HWYNUM = 2.
- LCN2 has its own HG1 connected to PHYSHWY1. HG1 on this LCN names PHYSHWY1 under the LCN-local logical identification of HWYNUM = 1.
- PHYSHWY1 has a Basic Controller called “CB15” at address 15. CB15 is owned (BOXASSN(15) = THISHG) by HG1 on LCN1. HG2 on LCN1 recognizes CB15 as an “ADDEDHG” box (BOXASSN(15) = ADDEDHG). HG1 on LCN2 recognizes CB15 as a “REMOTEHG” box (BOXASSN(15) = REMOTEHG)
- PHYSHWY1 has a Basic Controller called “CB25” at address 25. CB25 is owned (BOXASSN(25) = THISHG) by HG2 on LCN1. HG1 on LCN1 recognizes CB25 as an “ADDEDHG” box (BOXASSN(25) = ADDEDHG). HG1 on LCN2 recognizes CB25 as a “REMOTEHG” box (BOXASSN(25) = REMOTEHG)
- PHYSHWY1 has a Basic Controller called “CB35” at address 35. CB35 is owned (BOXASSN(35) = THISHG) by HG1 on LCN2. HG1 on LCN1 recognizes CB35 as a “REMOTEHG” box (BOXASSN(35) = REMOTEHG). HG2 on LCN1 recognizes CB35 as a “REMOTEHG” box (BOXASSN(35) = REMOTEHG)

Assume that you want to end up with the following Experion-TPS configuration where the HGs have been enhanced to EHBs and the CBs have been replaced with the C300-resident CEEs running emulations.

The essential characteristics of this configuration are as follows:

Figure 17: Illustration of a sample Hiway configuration replaced with emulations



- LCN1 has been connected to server cluster ESVT1. HG1 has been converted into EHB1 with a platform block which has the cluster-local name “EHB1”. EHB1 has IP address 10.0.0.1. HG2 has been converted into EHB2 with a platform block which has the cluster-local name “EHB2”. EHB2 has IP address 10.0.0.2.
- LCN2 has been connected to server cluster ESVT2. HG1 has been converted into EHB1 with a platform block which has the cluster-local name “EHB1”. EHB1 has IP address 10.2.0.1.
- CB15 and CB25 have been converted into Hiway emulations running in a C300 in cluster ESVT1. The C300’s CEE is called “CEE1”.
- CB35 has been converted into a Hiway emulation running in a C300 in cluster ESVT2. The C300’s CEE is called “CEE1”.
- CB15 has a ThisHG relationship with EHB1 in ESVT1. CB25 has a ThisHG relationship with EHB2 in ESVT1.
- CB35 has a ThisHG relationship with EHB1 in ESVT2.

You must configure the following in the order in which they are listed to achieve this configuration:

1. Configure EHBs
2. Configure CEEs
3. Configure box HRBs

5.6.1 Configuring the EHBs

The emulation properties of a physical Hiway emulation are defined on one EHB within each ESVT cluster.

To configure the EHBs

1 Create the module EHB1 in cluster ESVT1.

Within the cluster-ESVT1, EHB1 configuration form, provide the information necessary to define PHYSHWY1.

a Click **File**> **New**> **Gateways**> **EHB - Experion Hiway Bridge**.
The EHB configuration form appears.

b In the **Tag Name** field, type EHB1.

c Set the **Logical Hiway Num (HWYNUM)** to 1.

d Set the **Logical Hiway Num Partner (HWYNUMPRT)** to 2.

e Set the **Remote Partner 1 Address (PHWYPRTRMIP1)** to 10.2.0.1.
Retain **Remote Partner 2 Address (PHWYPRTRMIP2)** at its null value.

f Click **OK** to save the EHB1 configuration.
When an EHB is first created, **Define Physical Hiway (DFNPHWYEM)** defaults to On. When an EHB configuration is saved, **DFNPHWYEM** remains On if its **HWYNUM** has not already been defined as **HWYNUMPRT** by another EHB.

2 Create the module EHB2 in cluster ESVT2.
Within the cluster-ESVT1, EHB2 configuration form, provide the information necessary to define PHYSHWY1.

a Click **File**> **New**> **Gateways**> **EHB - Experion Hiway Bridge**.
The EHB configuration form appears.

Since the Hiway emulation has already been defined in the configuration of EHB1, only Logical Hiway Num (HWYNUM) needs to be entered into EHB2.

b Set the **Logical Hiway Num (HWYNUM)** to 2.

c Click **OK** to save the EHB2 configuration.

- Since the EHB2.HWYNUM value of 2 has already been configured as EHB1.HWYNUMPRT, EHB2.DFNPHWYEM is automatically set to Off after saving the configuration.
- All other configuration fields are automatically populated after saving the configuration.

3 Create the module EHB1 in cluster ESVT2.
Within the cluster-ESVT2, EHB1 configuration form, provide the information necessary to define PHYSHWY1.

a Click **File**> **New**> **Gateways**> **EHB - Experion Hiway Bridge**.
The EHB configuration form appears.

b In the **Tag Name** field, type EHB1.

c Set the **Logical Hiway Num (HWYNUM)** to 1.

d Retain the **Logical Hiway Num Partner (HWYNUMPRT)** to 0.

e Set the **Remote Partner 1 Address (PHWYPRTRMIP1)** to 10.0.0.1.

f Set the **Remote Partner 2 Address (PHWYPRTRMIP2)** to 10.0.0.2.

g Click **OK** to save the EHB1 configuration.
Since EHB1 is the only EHB defined in ESVT2, DFNPHWYEM remains On after the EHB1 configuration is saved.

5.6.2 Configuring the CEEs

Each CEE within a C300 can host only emulations of Hiway boxes which had been resident on the same physical Hiway and which have been defined within the same ESVT cluster. Characteristics of the physical Hiway known to the CEE are validated by the time the CEE platform block is loaded. Characteristics of the physical Hiway known to the box HRBs are validated by the time the blocks are loaded to their CEEs.

To configure the CEEs

1 Create the CEEC300 in cluster ESVT1.

a Click **File**> **New**> **Controllers**> **C300 Controller (2 I/O Links)**.

b Double-click the CEEC300 in the Project view.
The CEEC300 configuration form appears.

Within the CEE configuration form, provide the information necessary to define PHYSHWY1.

c Click the **EHB Communications** tab.

d Set HWYNUM1 to 1.
The value of HWYNUM1 establishes a link with the defining EHB whose HWYNUM matches the CEE's HWYNUM1. The configuration is complete after you set the HWYNUM1 on the CEE.

e Click **OK** to save the configuration.
The remaining fields in the CEE configuration form are filled out to match those of the EHB, either at the time the CEE configuration is saved, or at the time the CEE platform block is loaded.

2 Create the CEEC300 in cluster ESVT2.

a Click **File**> **New**> **Controllers**> **C300 Controller (2 I/O Links)**.

b Double-click the CEEC300 in the Project view.
The CEEC300 configuration form appears.

Within the CEE configuration form, provide the information necessary to define PHYSHWY1.

c Click the **EHB Communications** tab.

d Set HWYNUM1 to 1.
HWYNUM1 of a CEE must be configured to match the HWYNUM parameter of an EHB which has DFNPHWYEM set to ON.

e Click **OK** to save the configuration.

5.6.3 Configuring the Box HRBs

In this example, you can have emulations of CB15 and CB25 in the same CEE since they are being defined within the same ESVT cluster and since they emulate boxes which came from the same physical Hiway.

The emulation of CB35 must go into a different C300 under a different ESVT since it is defined within a differnt ESVT cluster.

1 Create emulations of CB15 using the HSE Creator Tool.

a Save the configuration of box CB15 to EB file, taking it from HG1 of LCN1.

b Using the HSE Creator Tool, translate the EB file into XML file.
When running the HSE Creator Tool, you must supply as input the EB file corresponding to the box configuration which has the ThisHG relationship between HG and box. In this example, that corresponds to HG1 of LCN1.

Note that using an EB file saved form HG2 of LCN1 or from HG1 of LCN2 results in a translation error.

The CB15 emulation has the following characteristics:

- Is assigned to CEE1 of ESVT1.
- Has HWYNUMTHIS set to 1. The HSE Creator Tool sets the HWYNUMTHIS value of the box HRB to match the HWYNUM configuration of the HG which had the ThisHG relationship with the box.

Attention

- The HSE Creator Tool does not set the value of HWYNUMADDED parameter. This value is auto-populated later, when the Box HRB is loaded as part of its HBSE.
- The HSE Creator Tool does not set the value of EHBRMIP1 or EHBRMIP2. That must be done as a subsequent, manual step after importing the emulations into the Experion Engineering repository database using Control Builder.

2 Import the CB15 emulation produced by the HSE Creator Tool into the Experion engineering repository database using Control Builder of ESVT1.

Attention
You must perform any manual configuration on the box emulation only after importing them into the Experion engineering repository database using Control Builder.

3 Configure EHBRMIP1 and EHBRMIP2 as required to establish relationships with remote EHBs. Set EHBRMIP1 to 10.2.0.1. Note that EHBRMIP2 is still set to 0.0.0.0

Attention
Configuration of remote IP addresses must be consistent with the remote IP address configuration of the parent CEE platform block which in turn is consistent with that of the EHB which defines the physical Hiway. If a box HRB has an inconsistent value of EHBRMIP1 or EHBRMIP2, load to the CEE fails.

4 Load the CB15 emulation to CEE1 of ESVT1.

After loading the CB15 emulation to CEE of ESVT1, the remaining box HRB configuration is auto-populated and validated. This includes parameters HWYNUMADDED, EHBTHIS, and EHBADDED.

5 Create the emulation of CB25 using the HSE Creator Tool.

a Save the configuration of box CB25 to EB file, taking it from HG2 of LCN1.

HG2 of LCN1 had the ThisHG relationship with CB25.

b Repeat steps 1 through 5 to produce emulation of CB25, assign and load to CEE1 within the Control Builder of ESVT1.

The configuration of the CB25 emulation must be as follows.

- HWYNUMTHIS is set to 2.
- EHBRMIP1 is set to 10.2.0.1
- EHBRMIP2 is set to 0.0.0.0

6 Create emulations of CB35 using the HSE Creator.

a Save the configuration of box CB35 to EB file, taking it from HG1 of LCN2.

HG1 of LCN2 had the ThisHG relationship with CB35.

b Repeat steps 1 through 5 to produce emulation of CB35, assign and load to CEE1 within the Control Builder of ESVT2

The configuration of the CB35 emulations must be as follows.

- Is assigned to CEE1 of ESVT2.
- HWYNUMTHIS is set to 1.
- EHBRMIP1 is set to 10.0.0.1
- EHBRMIP2 is set to 10.0.0.2

5.7 Example of an error in the configuration and modifying the configuration

There might be instances of introducing errors when setting up a configuration as described in “Example of a sample configuration” on page 46. If that happens, then recovering from the error can be time consuming. The Hiway emulation data of the EHB, the CEE and the Box HRBs have inherent consistency relationships which prevent errors that can lead to loss of control or loss of view. But those same relationships can require elements of configuration to be undone for an error to be corrected.

Assume that you want to set up the configuration as illustrated in the following diagram. This configuration is similar to that of the configuration in section “Example of a sample configuration” on page 46 except that a second CEE and Basic Controller have been added.

- CEE2 is in the cluster of ESVT1. It uses a model of PHYSHWY1 equivalent to the model used by CEE1 in the cluster of ESVT1.
- CEE2 hosts an emulation of Basic Controller CB45.

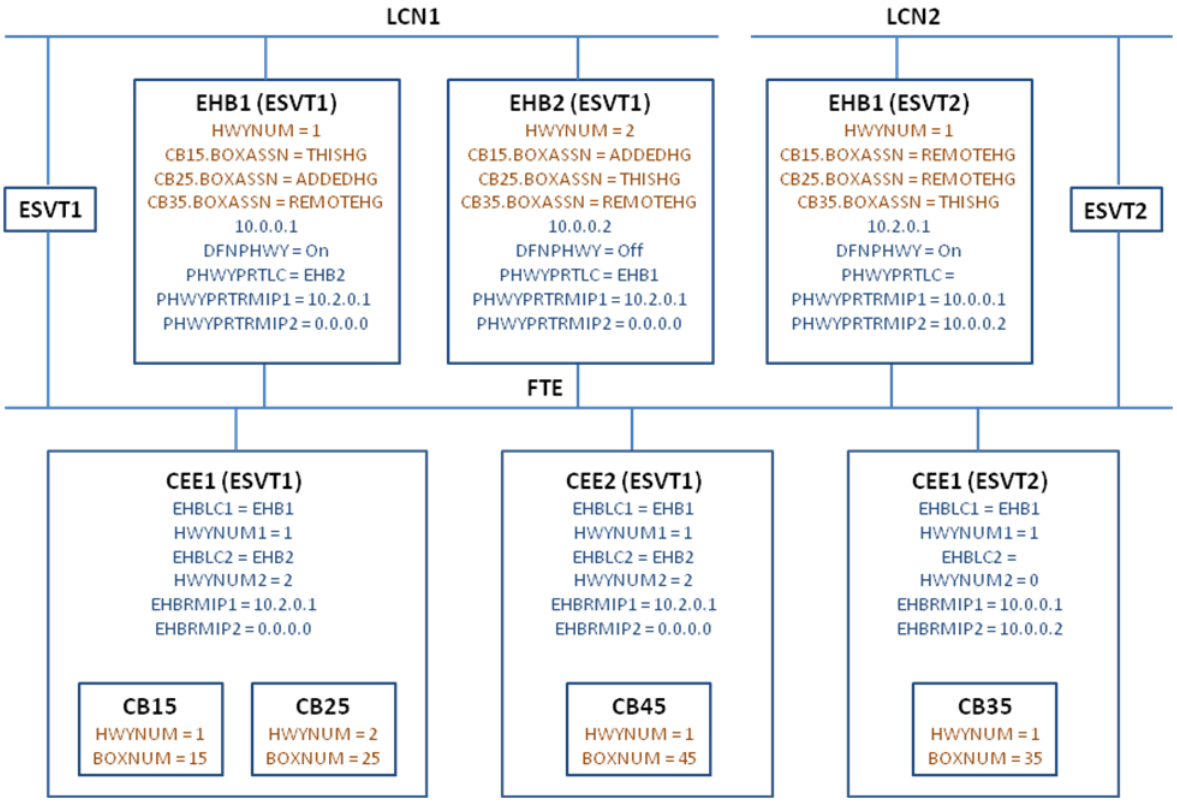


Figure 18: Example to illustrate configuration error

Assume that during the configuration, you make the following mistake.

In the physical Hiway model defined in EHB1 of ESVT1, **you set PHWYPRTRMIP1 to 10.2.0.2 instead of 10.2.0.1**.

This error is duplicated in the configuration of CEE1 and CEE2 before they are loaded. It is also duplicated in the configuration of box HRBs CB15, CB25, and CB45. In this scenario, you must modify the configuration of EHB1, EHB2, CEE1, CEE2, CB15, CB25, and CB45.

To correct this error, you must perform the following:

1. Delete the box HRB configuration

2. Change the box HRB configuration
3. Change the EHB configuration
4. Change the CEE configuration
5. Change the box HRB configuration

5.7.1 Delete the Box HRB configuration

1 In the Control Builder of EVST1, remove all HBSEs from CEE1 whose box HRBs contain the configuration error.

   a Delete CB15 from the Monitoring view.

   b Delete CB25 from the Monitoring view.

   The CEE1's configuration can be changed after all of its assigned box HRBs with the configuration error are deleted.

2 In the Control Builder of ESVT1, removes all HBSEs from CEE2 whose box HRBs contain the configuration error.

   a Delete CB45 from the Monitoring view.

   The CEE2's configuration can be changed after all of its assigned box HRBs with the configuration error are deleted.

5.7.2 Modify the EHB configuration

In the Control Builder of ESVT1, correct the configuration error in EHB1.PHWYPRTRMIP1 and reload the EHB platform blocks.

Since EHB1 is the defining EHB for the Hiway emulation, the EHB2 configuration is auto-populated to match the EHB1 configuration after the EHB1 configuration is saved.

1 Change EHB1.PHWYPRTRMIP1 from 10.0.0.2 to 10.0.01.

2 Reload the EHB1 platform block.

3 Reload the EHB2 platform block.

- EHB1 and EHB2 can be reloaded without disturbance to runtime operations in the EHBs themselves or in the dependent CEEs.
- After EHB1 and EHB2 are reloaded, the Hiway emulation model is available for auto-population to CEEs when the CEE platform blocks are reloaded.

5.7.3 Modify the CEE configuration

In the Control Builder of ESVT1, perform active load to reload the platform blocks of CEEs using the Hiway emulation of EHB1. Parameters EHBLCIP1, EHBLCIP2, EHBRMIP1, and EHBRMIP2 can be modified through active load.

1 Perform an active-load of the CEE1 platform block.

2 Perform an active-load of the CEE2 platform block.

5.7.4 Modify the Box HRB configuration

In the Control Builder of ESVT1, reconfigure and load each HBSE with an affected Box HRB.

1 Set EHBRMIP1 of the CB15 emulation to 10.2.0.1.

2 Load the CB15 emulation.

3 Set the EHBRMIP1 of CB25 to 10.2.0.1.

4 Load the CB25 emulation.

5 Set the EHBRMIP1 of CB45 to 10.2.0.1.

6 Load the CB45 emulation.

Since the remote IP address configuration of the CB15, CB25, and CB45 emulations are consistent with the CEE1's configuration, no errors are detected during load.

5.8 EHB load order

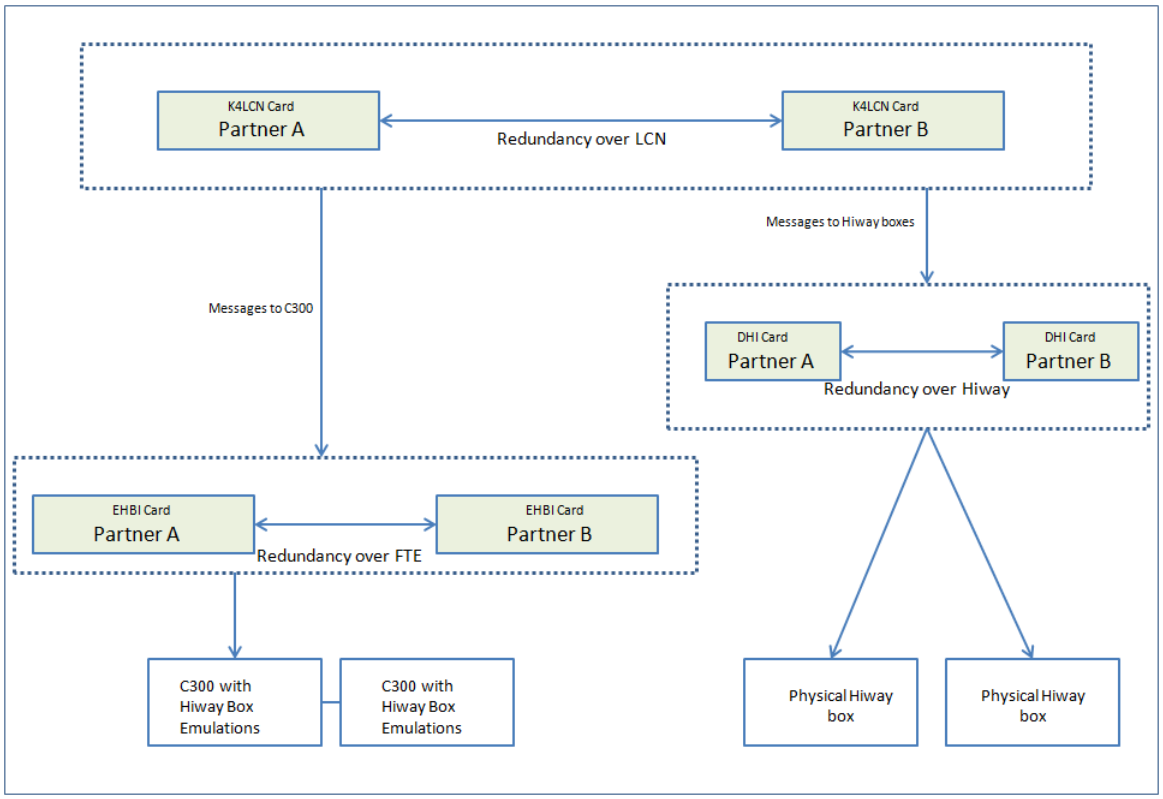
The EHB components must be loaded in the following order.

1. EHB platform block
2. C300 Controller block
3. Hiway Box Slot Emulation (HBSE) / Hiway Algorithm Slot Emulation (HASE)

6 EHB redundancy

EHB supports redundancy to provide a level of availability equivalent to that provided by redundant Hiway Gateways (HG). Each partner of a redundant EHB pair is capable of supporting all the communication and management functions required in Hiway emulation when its partner fails.

The following diagram summarizes the relationship between the various subsystems that make up a redundant EHB.



In EHB redundancy, communication over LCN, Hiway, and FTE are considered for making failover decisions. In general, when one of the partners (primary) that make up a redundant EHB pair loses its communication , failover occurs to let the partner EHB acting as a backup (or secondary) to takeover. If a fault is detected in the secondary or its network connectivity, the primary goes into a warning status to indicate that redundancy has been lost.

When the primary loses its communication on LCN, the secondary takes over as a backup. When the secondary loses its communication, redundancy is lost and a message indicating that the primary EHB does not have a backup is displayed.

For more information about the various failover scenarios, refer to the TPN documentation.

In a Junction Gateway configuration, LCN is connected to the physical Hiway (through DHI card) and the emulated Hiway (through the EHBI card). Therefore, the failover decisions are based on the following scenarios:

- LCN network failure
- FTE network failure
- Hiway Network failure
- FTE and Hiway network failure

In a Simple Gateway configuration, LCN is connected to the emulated Hiway (through the EHBI card). Therefore, the failover decisions are based on the following scenarios:

- LCN network failure
- FTE network failure

For more information about the following, refer to the TPN documentation:

- LCN redundancy
- Hiway redundancy
- Failover scenarios for EHB redundancy

6.1 EHB Redundancy configuration from the Experion Control Builder

Experion Control Builder enable you to create redundant EHB pairs in such a way as to reduce the need for duplicate configuration and to ensure that complimentary configuration of the partners is consistent. This section provides information about configuring redundant EHB pairs from Control Builder.

Parameters used in configuring redundant EHB pairs

The following parameters are used in configuring redundant EHB pairs. For more information about these parameters, refer to the *Control Builder Parameter Reference*

Parameter	Description
MODISREDUN (Mode is redundant)	This parameter is set to **On** with configuration of the first EHB. This causes the redundant partner EHB to be created automatically. The partner EHB also has MODISREDUN set to **On**.
RDNPARTNER (Partner Tag Name)	This parameter represents the tagname of the EHB's partner in the redundant pair. It is automatically set by the system.
DEVICEIDX (Device Index)	This parameter indicates the EHB's number within its IP address subnet.

Configuring redundant EHB pairs

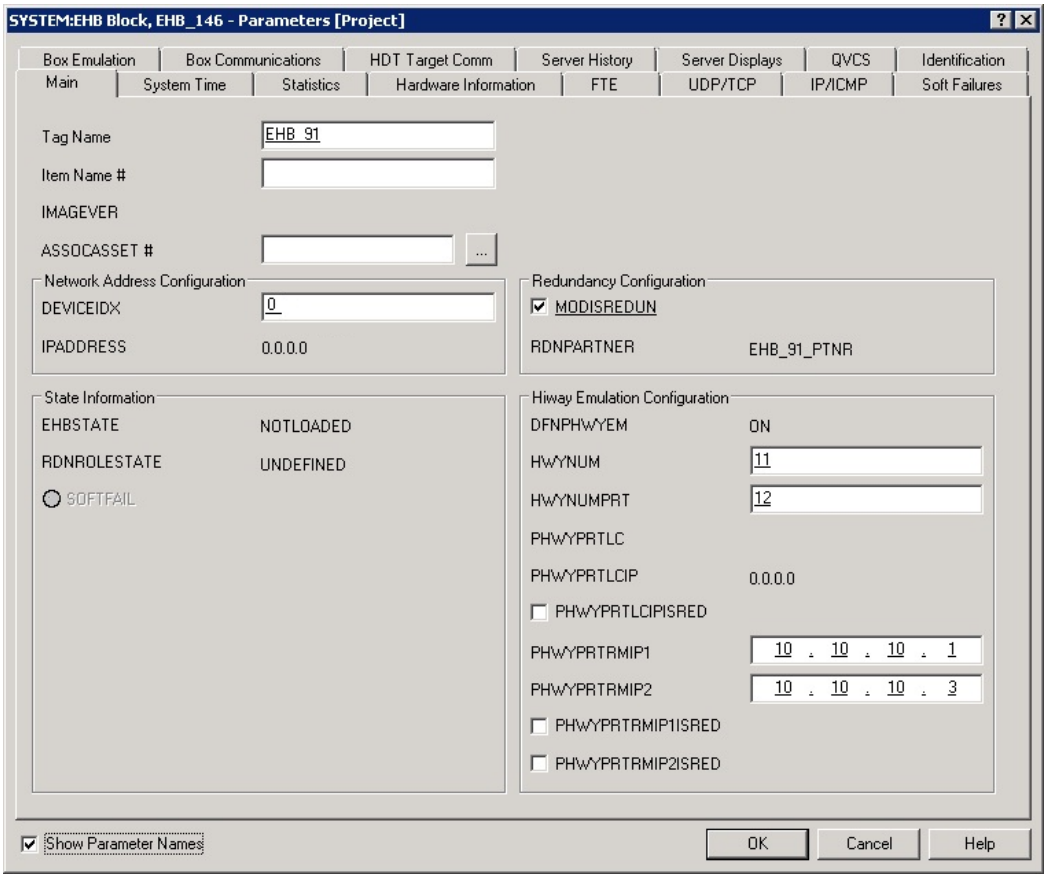
The partners of a redundant EHB pair always have identical Hiway emulation configuration. A redundant EHB pair is created when the user creates a single EHB and configures the parameter, MODISREDUN to **On**. The corresponding redundant partner is then created automatically by the system with complimentary configuration. Either node of the EHB pair can act as primary or secondary, but only one EHB is used for configuration. This EHB is referred as the "configuration master" or the Configured EHB, while the other is referred as the "configuration slave" or the Redundant EHB.

Perform the following steps to configure the Configured EHB:

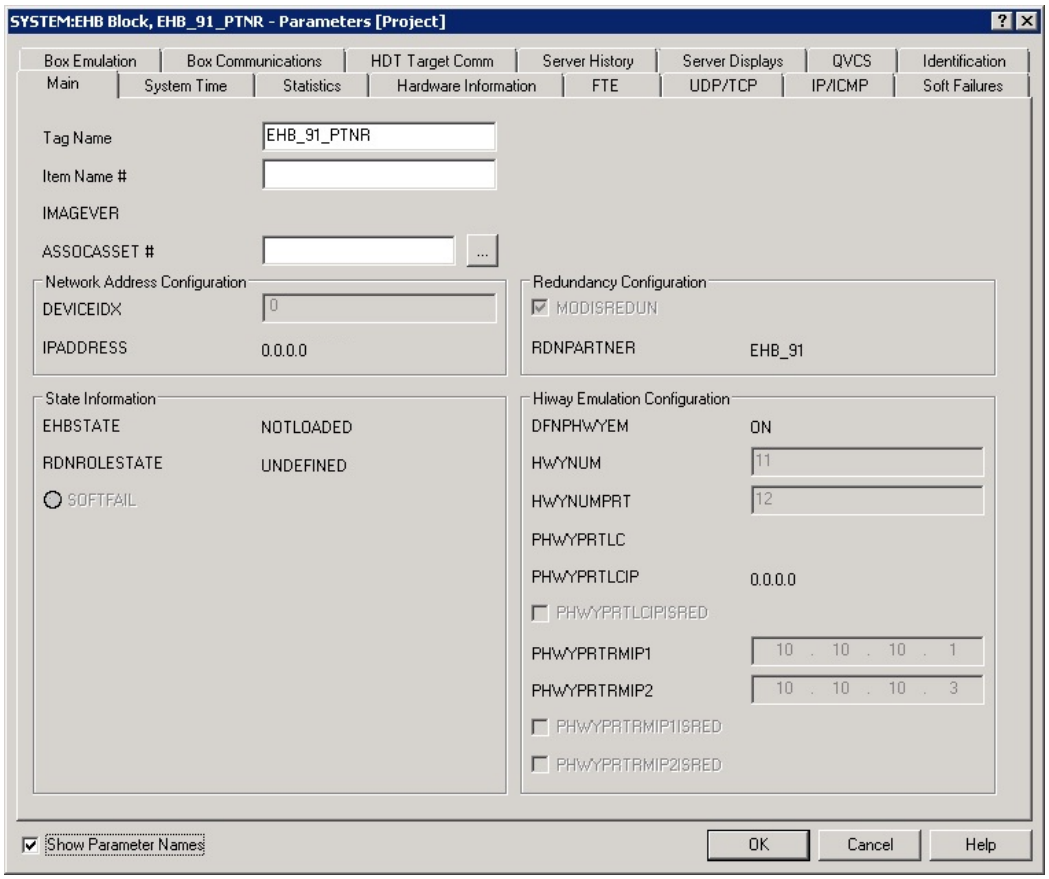
1. Click **File** > **New** > **Gateways** > **EHB** > **Experion Hiway Bridge**

   The EHB configuration form appears.
2. Specify the required details on the **Main** tab to configure the EHB as explained in *Configuring the EHB* in the *Control Building User's Guide*. You must specify the following information:
   - Tag Name
   - Device Index
   - Options in the Hiway Emulation Configuration section
3. Select **MODISREDUN** (Mode is Redundant) in the **Redundancy Configuration** section on the **Main** tab to configure the EHB as the "Configured EHB" of the redundant pair.
4. Click **OK**.

   The first EHB of the redundant pair is configured, as displayed in the following figure.



The corresponding redundant partner is created automatically by the system with complimentary configuration, as displayed in the following figure.



Note
The tag name (RDNPARTNER) of the redundant partner is automatically populated in both the configuration forms.

The redundant EHB in the pair can be distinguished within Control Builder by the following attributes:

- Tag name - The Redundant EHB gets its tag name automatically assigned. The tag name of the Redundant EHB has the suffix "_PTNR" (for "partner") appended to the tag name of the Configured EHB. This tag name can be changed, but if it is changed, it is recommend that the new name must clearly indicate that the EHB is the partner of the other.
- DEVICEIDX - The EHB that is first created (Configured EHB) always has an odd numbered DEVICIDX. The configuration of the Redundant EHB has a DEVICEIDX one greater than that of the Configured EHB.
- MODISREDUN - On the configuration form of the Configured EHB, MODISREDUN is normally highlighted and on the Redundant EHB, it is grayed out and cannot be changed.
- RDNPARTNER - On the configuration form of the Configured EHB, the RDNPARTNER displays the tag name of the redundant EHB (_PTNR" appended). On the Redundant EHB, the RDNPARTNER displays the tag name of the Configured EHB.

6.2 Modifying configuration details on the EHB platform block

After initial creation of a redundant EHB pair, any subsequent configuration changes can only be made at the EHB with odd DEVICEIDX and with MODEISREDUN not grayed out.

If EHB redundancy configuration values such as MODISREDUN or DEVICEIDX are changed, then associated CEEs must obtain corresponding configuration changes. This can be done without taking the CEE offline, by performing load-while-active.

The following sections provides details about modifying and deleting configuration details on the EHB platform block

Changing Device Index

The device index on a non-redundant EHB block/ Configured EHB can be changed:

- When the EHB is not loaded
- When no Box HRBs are assigned to any CEEs using the Hiway emulation defined by the EHB.

After the Device Index is updated on the Configured EHB, the changed value is updated in the Redundant EHB.

Note
Changing Device Index on the Redundant EHB is not allowed.

Changing the Hiway Emulation Configuration

The Hiway Emulation Configuration on a non-redundant EHB block/ Configured EHB can be changed:

- When the EHB is not loaded
- When no Box HRBs are assigned to any CEEs using the Hiway emulation defined by the EHB.

After the Hiway Emulation Configuration is updated on the Configured EHB, the changed value is updated in the Redundant EHB.

Note
Changing the configuration on Redundant EHB blocks is not allowed.

Converting a Redundant EHB pair to non-redundant EHB

If you want to convert a redundant EHB pair into a single, non-redundant EHB, MODISREDUN must be changed to Off at the EHB which has odd DEVICEIDX. The partner EHB is then automatically deleted by the system. This operation is subject to restrictions as follows

- Neither member of the redundant EHB pair must be loaded.
- The Hiway emulation model of the EHB pair must not be in use by any CEE.

Note
Changing the configuration of MODISREDUN on the Redundant EHB blocks is not allowed.

Copying, renaming, and deleting EHB blocks

The following table provides information about copying, renaming, and deleting EHB blocks.

Task	Description
Copying non-redundant EHB blocks, Configured EHB blocks, or Redundant EHB blocks	Copying the configurations of non-redundant, Configured, and Redundant EHB blocks is not allowed.

Task	Description
Renaming non-redundant EHB blocks, Configured EHB blocks, or Redundant EHB blocks	When you rename the block, all instances of the block name are updated with the new name.
Deleting Non-redundant EHB blocks	The non-redundant EHB blocks can be deleted if they are not already loaded or they are not configured in CEE.
Deleting Configured EHB blocks	The Configured EHB blocks can be deleted: • When the EHB is not loaded • When no Box HRBs are assigned to any CEEs using the Hiway emulation defined by the EHB. Deleting the Configured EHB block deletes the Redundant EHB block.
Deleting Redundant EHB blocks	Deleting Redundant EHB blocks is not allowed

7 Emulated algorithms and Hiway Responder Blocks

The following topics describe about Emulated algorithms and Hiway Responder Blocks (HRB).

Related topics

“Emulated algorithms” on page 64
“Hiway Responder Block (HRB)” on page 65

7.1 Emulated algorithms

When using the EHB, Hiway boxes are replaced by emulations running in C300 controllers. The emulations are created by translating HG points which represent the Hiway algorithm slots, into emulations. The emulation so created can consist of a single CEE Control Module or multiple CEE Control Modules. Set of such CMs is called a Hiway Algorithm Slot Emulation (HASE).

When Hiway algorithms slots are emulated within a C300, the slots which represent shared box data also need to be emulated. This common data has traditionally been called the “Box Slot”. Emulations of box slots are called Hiway Box Slot Emulations (HBSE).

Hiway Box Slot Emulation (HBSE)

For each box configuration, an HBSE is generated, consisting of a single CM containing an HRB.

Each HBSE contains a single HRB that supports transfer of Hiway messages between the C300 Controller and the EHB.

Hiway Algorithm Slot Emulation (HASE)

The HASEs are comprised of multiple CMs, in which one CM called the algorithm CM has the capabilities such as PID control, alarm processing, and so on. The algorithm CMs fetch/write data to the IO channels that are configured in other CMs. The HASE can also contain an AI CM/AO CM if the AI/AO channels are configured to be part of the CM algorithm. If the AI and AO channels are configured to be in separate CM, then, three CMs are generated.

The HASE tag names are identical to the HG point names.

For example, if the exported algorithm slot name is TC101, based on the pattern preference setting, the generated HASEs consist of three, two, or one CM.

- **Three CMs**: If you have set the pattern preference in the HSE Creator Tool such that you want the AI and the AO channels to be in separate CMs, then the generated HASE consists of the following three CMs.
  - TC101
  - TC101_AI
  - TC101_AO
- **Two CMs**: If you have set the pattern preference in the HSE Creator Tool such that you want the AI or the AO channel to be in separate CMs, then the generated HASE consists of the following two CMs.
  - TC101
  - TC101_AI or TC101_AO as per the pattern preference.
- **Single CM**: If you have set the pattern preference in the HSE Creator Tool such that you want the AI and the AO channels to be a part of the algorithm CM, then the generated HASE consists of the following CM.
  - TC101

Each HASE contains a single Hiway Responder Block (HRB), located within the algorithm CM, that supports transfer of Hiway messages between the C300 Controller and the EHB.

Note

- The name of the Algorithm CM is identical to the name of the EB file entity.
- The name of the AI CM is the HG slot name suffixed with “_AI,” which is user-configurable.
- The name of the AO CM is the HG slot name suffixed with “_AO,” which is user-configurable.

7.2 Hiway Responder Block (HRB)

Hiway Responder Blocks are special purpose communication blocks that support transfer of Hiway messages between the C300 Controller and the LCN EHB.

HRB blocks are automatically instantiated in Control Modules when Hiway slot emulations are created by the HSE Creator Tool. They are then imported into Experion engineering repository database using Control Builder along with their parent Control Module.

The HRB blocks are classified into two major categories.

- Algorithm Hiway Responder Block: Acts as an interface between the CEE native blocks and the EHB. HRB receives data from the EHB and transfers it to the CEE native blocks for processing. They also read the processed data from the CEE and update the HG point.
  - Regulatory Algorithm Hiway Responder Block (HRBALG_REG)
  - Analog Input Algorithm Hiway Responder Block (HRBALG_AI)
  - Digital Input Hiway Responder Block (HRBALG_REG)
- Basic Controller Box Hiway Responder Block (HRBBOX_CB) and Extended Controller Box Hiway Responder Block (HRBBOX_EC): Box HRB represents the HG box in Experion.

Attention

- HRBs are available in the Control Builder library, in the folder HIWAYRB.
- Most HRB parameters are automatically configured. They are initially defined by the HSE Creator Tool and should not be modified thereafter unless it is necessary to change the configuration of the emulation. If that is done, the change should be injected into the HG point and points must be re-translated using the HSE Creator Tool. Leaving HRB parameters in a consistent state is the responsibility of the user as this guideline is not enforced by the system.
- Users should not modify parameters of native CEE blocks within the emulation from the Experion view.

Related topics

“Basic Controller Hiway Box Hiway Responder Block (HRBBOX_CB)” on page 65
“Extended Controller Hiway Box Hiway Responder Block (HRBBOX_EC)” on page 66
“Regulatory Algorithm Hiway Responder Block (HRBALG_REG)” on page 66
“Analog Input Algorithm Hiway Responder Block (HRBALG_AI)” on page 67
“Digital Input Algorithm Hiway Responder Block (HRBALG_DI)” on page 68
“HRB registration after an HBSE is loaded” on page 68

7.2.1 Basic Controller Hiway Box Hiway Responder Block (HRBBOX_CB)

The Basic Controller (CB) Hiway Box HRB is intended to execute by itself within a Control Module. The CM so formed acts as the Hiway Box Slot Emulation (HBSE) of the CB. This HRB performs the following two functions.

- Make available for LCN access those Hiway parameters which characterize the CB box as a whole such as the CB Status Word, CB the Alarm Word and the CB Sample Time Counter.
- Serve as a conduit for data communication between the EHB and the algorithm HRBs assigned to the box emulation.

The following parameters are available in the HRBBOX_CB block.

- BOXNUM
- BOXTYPE
- CARDTYPE[1]
- EHBADDED

- EHBADDEDIP
- EHBTHIS
- EHBTHISIP
- EHBRMIP1
- EHBRMIP2
- HWYNUMTHIS
- HYNUMADDED

For more information about the parameters, refer to the *Control Builder Parameter Reference*.

7.2.2 Extended Controller Hiway Box Hiway Responder Block (HRBBOX_EC)

The Extended Controller (EC) Hiway Box HRB is intended to execute by itself within a Control Module. The CM so formed acts as the Hiway Box Slot Emulation (HBSE) of the EC. This HRB performs the following two functions.

- Make available for LCN access those Hiway parameters which characterize the EC box.
- Serve as a conduit for data communication between the EHB and the algorithm HRBs assigned to the box emulation.

The following parameters are available in the HRBBOX_EC block.

- BOXNUM
- BOXTYPE
- EHBADDED
- EHBADDEDIP
- EHBTHIS
- EHBTHISIP
- EHBRMIP1
- EHBRMIP2
- HWYNUMTHIS
- HYNUMADDED
- TOGDESC
- TOGINTERVALS
- TOGINTSEL

For more information about the parameters, refer to the *Control Builder Parameter Reference*.

7.2.3 Regulatory Algorithm Hiway Responder Block (HRBALG_REG)

The Regulatory Hiway Responder Block communicates with its associated Box HRB to connect the HG point on the LCN with native blocks in a Control Module assigned to a CEEC300. It is specifically designed to present data of regulatory CEE blocks to the HG regulatory point.

The following parameters are available in the Regulatory block:

- ALGOREGSTATE
- ALGOPROCSTATE
- ALGOTYPE
- AUTOMAN
- AUTOMAN2
- BOOLEANA, BOOLEANB, BOOLEANC
- BOXNUM

- BOXTYPE
- BOXCON
- DATAACQ1
- DATAACQ2
- DATAACQ3
- DEADTIME
- ENHREGCALC
- HSWDESC
- HSWVALUE
- INT32A, INT32B, INT32C
- LEADLAG
- MODEEM
- MODEPOLICING
- MPVEM
- NUMERIC1, NUMERIC2
- OPEM
- OPTOAOCONN
- OVRDSEL2
- PTHBRKSTS
- PID
- PVEM
- RAMPSOAK
- RATIOEM
- REALA, REALB, REALC
- REGCALC
- REMCAS
- SLOTNUM
- SLOTTYPE
- STARTOPSEL
- SPEM

For more information about the parameters on the Native Block Reference tab, refer to *Control Builder Parameter Reference*.

For more information about the parameters, refer to the *Control Builder Parameter Reference*.

7.2.4 Analog Input Algorithm Hiway Responder Block (HRBALG_AI)

The Analog Input (AI) HRB is an algorithm HRB block which presents data of the CB AI emulation. It transfers data between the native DATAACQ block and the Hiway Slot Memory (HSM).

The following parameters are available in the HRBALG_AI block.

- ALGOREGSTATE
- ALGOPROCSTATE
- BOXNUM
- BOXTYPE
- BOXCON
- DATAACQBLOCKID1

- HSWDESC
- HSWVALUE
- PATHBRKSTS
- SLOTNUM
- SLOTTYPE

For more information about the parameters, refer to the *Control Builder Parameter Reference*.

7.2.5 Digital Input Algorithm Hiway Responder Block (HRBALG_DI)

The Digital Input (DI) HRB is an algorithm HRB block, which presents data of the EC DI emulation. The EC DI HRB algorithm block acts as an interface between the native Experion blocks and EHB. The native function blocks include, DI, DEVCTL, Logic OR, TRIG block, and the FLAG block.

The following parameters are available in the HRBALG_DI block.

- ALGOREGSTATE
- ALGOPROCSTATE
- BOXCON
- BOXNUM
- BOXTYPE
- DEVCTL
- NUMINPTS
- INPTDIR
- PATHBRKSTS
- SLOTNUM
- SLOTTYPE

For more information about the parameters, refer to the *Control Builder Parameter Reference*.

7.2.6 HRB registration after an HBSE is loaded

When an HBSE is loaded, the box HRB contained within it tries to register itself with the EHB. If the registration is successful, then the load completes and the HBSE can be activated. If the registration fails, then the load is aborted with an error message “Box registration failed.” If the registration of the box fails, then the HBSE containing the box HRB cannot be activated.

Attention

Box HRB registration can also fail for the following reasons:

- Another box with an identical box number already exists and is registered.
- IP address parameter value in the EHB Communication tab of the CEE and IP address parameters configured in the box HRB do not match.
- If the box type is changed from Normal to Extended and the HBSE is reloaded. It is recommended to delete HBSE, change configuration, and then reload it.
- Changing the Card type value on the box HRB from one value to another with the exception of changing it from “None” to some other value.

An algorithm is associated with the box through the function block connector on the algorithm HRB. This is configured through the HSE Creator Tool. Using this configuration, an algorithm is registered with the box.

The following are the various algorithm states:

- Registered - Algorithm HRB is registered with the box HRB and read/write can take place with LCN.
- Unregistered - Algorithm HRB is not registered with the box HRB. In this state, the algorithm HRB continuously attempts to register itself with the box HRB. Read/Write does not work with LCN.

- RegistrationFail - Algorithm HRB attempted registration with the box HRB and registration failed. In this state read/write with LCN does not work. In this state, Algorithm HRB does not try to re-register itself with the box HRB. User intervention is required to get the Algorithm HRB out of this state.

8 Combo Point Functionality

To provide a more consistent experience when using the EHB and its under lying C300-based emulations, Experion system services provide a means for unifying data associated with an HG pint and with a CEE Control Module under a single tag name. This functionality is called “Combo Points”. The following figure illustrates key concepts of this functionality.

The following figure illustrates key concepts of this functionality.

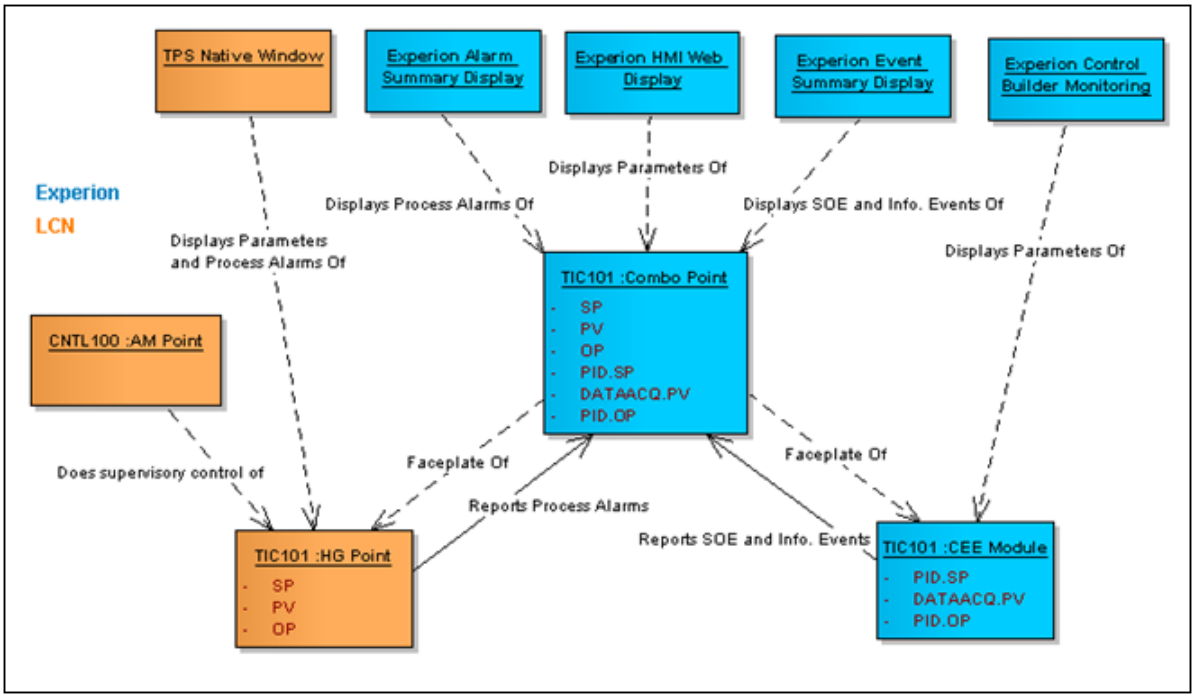


Figure 19: Illustration of Combo Points

Services of the Experion-TPS system allow two different kinds of control objects, an HG point resident in an EHB, and a HASE (the Algo. CM of the HASE in particular) resident in a CEE, to be viewed under a common tag-name.

In the diagram, the orange object called “TIC101” is the HG point while the lower blue object called “TIC101” is the HASE. Combo Point functionality allows these two distinct objects to share the name “TIC101”. HG points have parameters accessed by 2-level names like “TIC101.PV” while Algo. CMs have parameters accessed by 3-level names like “TIC101.DATAACQ.PV”. Except for isolated exceptions, this difference in name form allows parameters from the HG point and the HASE to be accessed under the same tag-name, the Combo Tagname, as though they were part of the same object. The logical union of these parameters forms the Combo Point, shown as the upper blue “TIC101” object in the diagram.

Key enablers of the Combo Point functionality are provided by the Experion Server TPS Node (ESV-T) and the Experion Console Station TPS Node (ES-T).

When an EHB is used to connect Experion controllers to an LCN network, Combo Tagnames can appear in several instances involving different Experion-TPS subsystems.

- Fully qualified parameter names can be used in HMI Web Displays. Parameters that exist on HG points and parameters that exist on HASEs can both be referenced. However, when designing such displays, Application Engineers must be aware that some HASE parameters are not fully representative of the true data values obtained by access through the HG points.
- In the majority of use cases, process alarms are issued by the HG Point with alarm reporting capability of the associated HASE CM being disabled. This prevents operator confusion that would result if information about the same alarm is duplicated within the display.
- Event notifications issued by either of the control objects underlying the Combo Point appear under the shared Combo Tagname within the Experion Event Summary Display. Events reported by the HG point and the HASE are generally different so both categories of events are reported in the Event Summary Display.
- The unification provided by the Combo Point applies only to operating services provided by an Experion Station or Server. When a TPS Native Window is used or when a GUS display is used, parameter references are made using the Combo Tagname, but data access goes directly to the HG point via the LCN. Combo Point services are not involved.
- Access from the Experion Control Builder Monitoring client to parameters of the HASE go directly to the hosting CEE without the involvement of Combo Point services.
- Combo Point services are not involved in communication between LCN-native supervisory control strategies and HG points. Thus, a Combo Tagname can be used to establish the connection between a “CNTL100” point in an AM and a “TIC101” point in an HG, but only LCN communication is involved in the data access.
- Combo Tagnames are used to name HG Points which represent Hiway algorithms and CEE Control Modules which hold the emulation of Hiway algorithms. Combo Tagnames and Combo Points are not used in association with box emulations (HBSEs) that run under EHBs.

8.1 About the COMBOPOINT parameter

Control Modules which are acting as part of a Combo Point are distinguished from ordinary CMs by the setting of parameter COMBOPOINT. This parameter can be seen on the Main tab of the CM configuration form at label “Extend TPS Point”. The label terminology “extend” indicates that the CM can be considered and extension of the HG point that bears the same tagname.

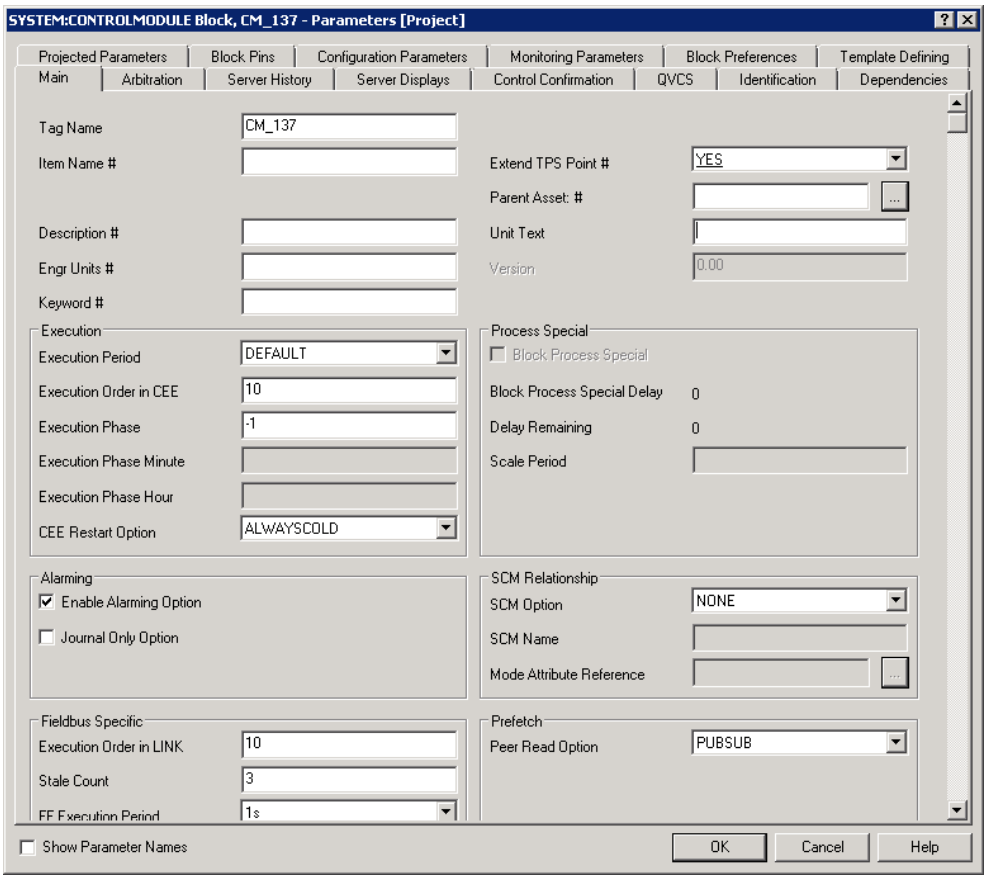


Figure 20: Control Module configuration form - Main tab

- When the COMBOPOINT parameter (“Extend TPS Point” in the preceding figure) is set to “No,” all access to the parameters of the CM and its component blocks goes through the CDA as is normal for Experion. This is the default CM behavior.
- When the COMBOPOINT parameter is set to “Yes,” any parameter which can be found in the EHB is accessed from its HG point. If a parameter cannot be found in the EHB, then it is accessed from the algorithm CM in the CEE. Note, however that in the rare case that both the HG point and the CM have a 2-level parameter of the same name precedence rules determine whether it is accessed from the HG point or from the CM. See below for further information on precedence.

  When COMBOPOINT parameter is set to “Yes,” ESV-related data entry fields are not relevant as their values are either not supported or are derived from the properties of the HG point. In addition, tabs which are normally used to configure ESV-related data are hidden. Also, the following ESV-related data that appear on the Main tab are visible but non-functional since they are acquired from the HG point.

  – Parent Asset
  – Item Name

  In addition, the following tabs are hidden.

  – Server History tab

– Server Displays tab
– Control Confirmation tab

Attention

- Within Experion, using the value “Yes” for COMBOPOINT is not supported unless the CM has a tag name, which matches that of an LCN point.
- When an emulation CM is used under an EHB, the value of the COMBOPOINT parameter is set automatically by the HSE Creator Tool. Application engineers are allowed to manually change COMBOPOINT from “No” to “Yes.” However, this feature is expected to be rarely used.
- If you want to decommission an HG Point and allow the HASE to function on its own, you can terminate any Combo handling done by the ESV-T or the ES-T. This is done by changing the COMBOPOINT parameter from “Yes” to “No” and reloading with no change in the tag name. When the Combo Point option is disabled, the ESV-T and the associated ES-Ts reclassify the associated tag name from a TPN point into a CDA point.
- Within Experion, using the value “Yes” for COMBOPOINT is not supported unless the CM has a tag name which matches that of an LCN point.

Attention

- Combo Tagnames are used to name the HG points which represent the Hiway algorithms and the CEE Control Modules which hold the emulation of Hiway algorithms. Combo Tagnames and Combo Points are not used in association with the box emulations (HBSEs) that run in the EHBs.
- To achieve the Combo Point functionality, both the HG points and the algorithm CMs, which are logically grouped under a Combo Tagname must be present. Removal of either one causes the Combo Point functionality to cease to function properly.

Attention

- The Combo Point option cannot be used to associate any other kind of tagged objects under the same tag name. A CM cannot have the Combo Option set to “Yes” unless its tag name matches that of an HG point.
- When a CM is configured as a Combo Point, the Delete Server Points menu option is disabled since the Combo Point relationship cannot be maintained without the point being present in the server.

  The Delete Server Points menu option can be accessed by right clicking the CM from Monitoring view in Control Builder.

8.2 Avoiding parameter name collisions when modifying HASEs

Name collisions between parameters of the two objects which share the Combo tagname, the HG point and the HASE, will generally never occur under normal circumstances. However, if an Application Engineer chooses to modify a HASE, say by adding projected parameters, then name collisions could occur. The following points summarize important considerations regarding the uniqueness of parameter names on Combo points.

HASEs are created using the HSE Creator Tool which translates the HG configuration EB files into the XML files. The HSE Creator Tool generates algorithm CMs that have the capabilities such as PID control, alarm processing, and so on. The algorithm CMs never use block or parameter names which collide with the parameters of the HG point except for the following two known cases of collision:

- <Combo-tag>.EUDESC
- <<Combo-tag>.KEYWORD

These collisions do not cause problems because both EUDESC and KEYWORD are text parameters whose values are initialized to match those of the partner HG point.

A fully qualified parameter names of an HASE algorithm CM can have the following forms.

- <Combo-tag>.<CM-parameter-name>
- <Combo-tag>.<Projected-parameter-name>
- <Combo-tag>.<Block-name>.<Parameter-name>

The following list summarizes the guidelines that must be followed to avoid the parameter name collision while modifying the HASEs.

- If <CM-parameter-name> is EUDESC or KEYWORD, the parameter value must not be changed.
- <Projected-parameter-name>must never match the name of any HG point parameter.
- <Projected-parameter-name>must never contain “.”.
- <Block-name> must never match the name of any HG point parameter of type entity-id. This excludes the following names from being used as block names within a HASE algorithm CM.
  - ACP
  - ASLTSRC
  - CCPRIPNT
  - CSLTSRC
  - EIPPCODE
  - GREENSRC
  - MSLTSRC
  - PRIMMOD
  - PVSLTSRC
  - SPSLTSR
  - ZSLTSRC
- <Block-name>.<Parameter-name> must never match an HG point parameter name which means that the <Block-name> matches a parameter name and the <Parameter-name> matches a property name.

  This can be achieved by avoiding the use of the Custom Block Types (CABs or CDBs) in the algorithm CM which have custom parameter names matching the HG parameter property names. The HG parameter property names are as follows:
  - BOTH
  - DURATION
  - EXTERNAL
  - INTERNAL

  There are no CEE native blocks with the parameters matching the above property names.

8.3 Considerations on Combo Point functionality

Parameter Values

- Display and connection access should not be directed to HASE Parameter values accessible through the HG point of a Combo tag are produced through a combination of actions by the HASE and actions by the HG point. The correct value can always be accessed through the HG point. But with direct access to the HASE, values of key parameters such as REDTAG, MODEATTR, PVSOURCE and PV, might not always be consistent with the HG point. They will not have been subjected to HG processing. It is strongly recommended that direct access to HASE data be avoided. Instead, both display access and control connection access should go to the HG point or through the ESV-T Combo Point.

Options for control connections

- If supervisory or peer control strategies are created to work with HASEs the following options may be used to access data from the HG point thereby insuring that the proper data is always obtained.
  - Supervisory access from AM directly to the HG point.
  - Supervisory access from an ACE-T node directly to the HG point.
  - Access via Peer Server Responder to the HG point from CEE modules running in a C300 or ACE.

Access Precedence

Precedence in name collisions

- Display access prioritizes HG point - When ESV-T or ES-T displays request parameters from Combo tags, the parameter is requested first from the HG Point, and if not found there, from the HASE. . For example, if the combo tagname is “TIC101” and parameter “TIC101.PV” is defined on the HASE as a projected parameter, station displays will fetch the value from the HG point. For further information on name collisions see below.
- CEE connection access prioritizes HASE - When a CEE module connects to a parameter of a Combo tag, the binding goes to the HASE parameter first, and only to the HG parameter if no HASE parameter of that name exists. For example, if the combo tagname is “TIC101” and parameter “TIC101.PV” is defined on the HASE as a projected parameter, CEE connections will fetch the value from the HASE rather than the HG point. For further information on name collisions see below.

Cluster Localization

- Combo Points and HASEs are known to Experion in only one ESV-T

  Combo Points can be loaded to the ESV-T of only one cluster. That cluster must correspond to the one in which the associated Hiway box emulation is viewed as “ThisHG” by the EHB.
- Station displays can access HASE parameters from only one ESV-T cluster

  The algorithm CM (HASE) parameters are accessible from ESV-T and ES-T displays if the HG point corresponds to a box emulation viewed as “ThisHG” from the ESV-T cluster. From such a cluster, HASE parameters can be used within the HMI Web displays, including displays used for operation in cutover scenarios when the HG point cannot access the HASE data. The HASE parameters are not accessible from the ESV-T and the ES-T displays if the HG point corresponds to a box emulation viewed as “RemoteHG” within the ESV-T cluster.

Access Path

- TPN displays can access HG Point HASE parameters from any EHB-connected TPN

  The HG point parameters can be accessed from the Native Window, the GUS, and the HMI Web displays regardless of whether the ESV-T cluster has an EHB which views the associated box emulation as “ThisHG” or “RemoteHG.”

- TPN access to HG Points is direct

  When a TPS Native Window is used or when a GUS display is used, parameter references are made using the Combo tag name, but data access goes directly to the HG point through the LCN. Combo Point services of the ESV-T are not involved.
- Control Builder access to HASEs is direct

  Access from the Experion Control Builder Monitoring client to parameters of the HASE go directly to the hosting CEE without the involvement of Combo Point services.
- AM access to HG Points is direct

  Combo Point services are not involved in communication between the LCN-native supervisory control strategies and the HG points. Thus, a Combo tag name can be used to establish the connection between a point (for example CNTL100) in an AM and a point (for example TIC101) in an HG, but only the LCN communication is involved in the data access.

Notifications

- Events notifications from HG points and HASEs - Events reported by the HG point and the HASE of a Combo Point are visible in Experion Station notification displays. Events reported by the HASE are not visible in the TPS notification displays.
- Alarms notifications from HG points and HASEs - Process alarms reported by either the HG point or the HASE are visible in the Experion Alarm Summary display. However, process alarms are normally reported only by the HG point since alarms are in general disabled at the HASE CM. This prevents operator confusion that can result if information about the same alarm is duplicated within the displays. It is recommended that HASE alarming remain disabled during normal operation.

Display Call Up

- Display call up

  Although they show both parameters of the HG pint and parameters of the HASE, Combo Points are fundamentally TPN points. They can be viewed using TPN HMI Web displays, Native Window displays or GUS displays. Combo Points cannot viewed using CDA (Control Data Access) detail displays as. CDA displays work for tags which are known to ESV-T as CDA points but not for points which are known as TPN points. The default display call up behavior for a Combo tagname is to invoke the ES-T Or ESV-T TPN HMI Web display. This default behavior can be reconfigured to target the native window display if desired or the native window display can be called up explicitly.
- Import and load in the presence of Peer Server Responder references

  A CM that shares a combo tag name with an HG point cannot be imported to ERDB while there are Peer Server Responder references to the HG point. Any such references must be identified before import, deleted, and then recreated after import. Load of HASEs from Control Builder to C300 is not affected by the presence of Peer Server Responder connections to the Combo tagname.

Building

Combo Point CMS cannot be loaded unless an HG point of the same tagname exists - When a CM with COMBOPOINT set to “Yes” is loaded, a validation check is done to ensure that an HG point with the same tag name exists under the ESV-T. If it does not exist, the load to ESV-T fails and the load to the SR and the CEE is not attempted.

8.4 Converting HASEs under an EHB into a pure CEE module

You can convert some or all of the HASEs under an EHB to operate as pure Experion CMs, if required. This conversion involves system wide considerations that extend beyond simple configuration changes applied to the HASE algorithm CM itself.

General procedure

To convert the HASEs under an EHB to operate as a pure Experion CMs, you must decommission an HG point thereby terminating the combo handling done by the ESV-T or the ES-T. When the COMBOPOINT parameter is disabled, the ESV-T and the associated ES-Ts reclassify the associated tag-name from a TPN point into a CDA point.

Attention
When a Combo Point is converted to a pure CEE module, any preexisting Peer Server Responder references to the HG point need to be reformed. Reloading the CEE module which makes the reference is not sufficient. The connection which had referenced the HG point must be deleted and recreated, after which the CEE module must be reloaded.

To convert the HASEs under an EHB into a pure CEE module

1. From the Control Builder Monitoring view, perform an upload of the HASE algorithm.
2. From the Control Builder Project view, perform an update of the HASE algorithm.
3. Change the value of the COMBOPOINT parameter (**Extend TPS Point** option on the form) from “Yes” to “No.”
4. Select the appropriate configuration for NMODE and NMODEATTR on all regulatory control blocks. If appropriate, change the value of MODEATTR from `Prog` to `Oper` on the Regulatory Control blocks.
5. Change the value of ALMENBSTATE from `Off` to `On` on the regulatory control blocks.

   Note
   In most cases, the algorithm CM of the HASE collection executes with ALMENBSTATE set to `Off`. This prevents duplicate process alarms from appearing in the ES-T alarm summary display. When the HASE is converted to pure Experion, ALMENBSTATE must be set to `On`.
6. In the TPS Data Entity Builder, delete the relevant HG point.

   Note
   The HG Point must be deleted before the CM with COMBOPOINT = No can be loaded to ESV-T. Otherwise, the load will fail due to a name collision error. Data through ESV-T ceases to function when the HG Point is deleted.
7. Load the HASE algorithm CM from Control Builder.

   Attention
   After the load, the ESV-T recognizes the point as a CDA point rather than a TPN point. The point is replicated to ES-Ts. Access to CDA parameters of the Control Module through ESV-T or ES-T is resumed.

Note that the above steps list some essential items involved in converting a HASE to a pure CEE CM but system wide considerations go beyond those steps. Conversion must include a strategy for migration of operational graphics displays, migration of supervisory control and migration of level 3 advanced applications.

8.4.1 Converting Combo Point in the presence of Peer Server Responder Connection

Experion supports peer to peer connectivity to ESV point data which is not directly accessible via CDA. For example, a peer reference can be made from a PMD or CEE controller to an HG point. In such connections, the ESV plays a role as an intermediate data transfer agent. Such connection references are called Peer Server Responder references.

Perform the following steps to convert a Combo Point to a pure CEE module in the presence of Peer Server Responder (PSR) connection.

To convert Combo Point in the presence of Peer Server Responder Connection

1. Perform the steps discussed in the "Converting HASEs under an EHB into a pure CEE module" on page 78 to convert the HASE into a pure CEE module.

   After deleting the HG point and loading the modified CM, a Bad PV alarm is reported.
2. From the Control Builder Project view of the CM (for example, FIC101), delete the parameter connector that references the HG parameter.
3. Create a new parameter connector, which references the corresponding CEE parameter.

   Any parameter connector pointing to the deleted HG point must be explicitly deleted and reformed. Reloading a CM, which had formerly referenced the HG point part of a Combo tag is not sufficient.
4. Load the non-emulation CM.

   The Bad PV alarm returns to normal.

9 Translation of the HG configuration into standard Experion Control Builder configuration files

The creation of emulations to run in C300s under EHBs involves the process of "Translate and Load." This process involves using a combination of TPS and Experion tools.

All required tools can be accessed from an Experion Console Station TPS (ES-T) node.

Using the process of translate and load is one of the perquisites for both Cold cutover and Hot cutover.

The following diagram illustrates the major subsystems involved in the "Translate and Load" process.

Note

The application engineer performing the translation and load proceeds from left to right.

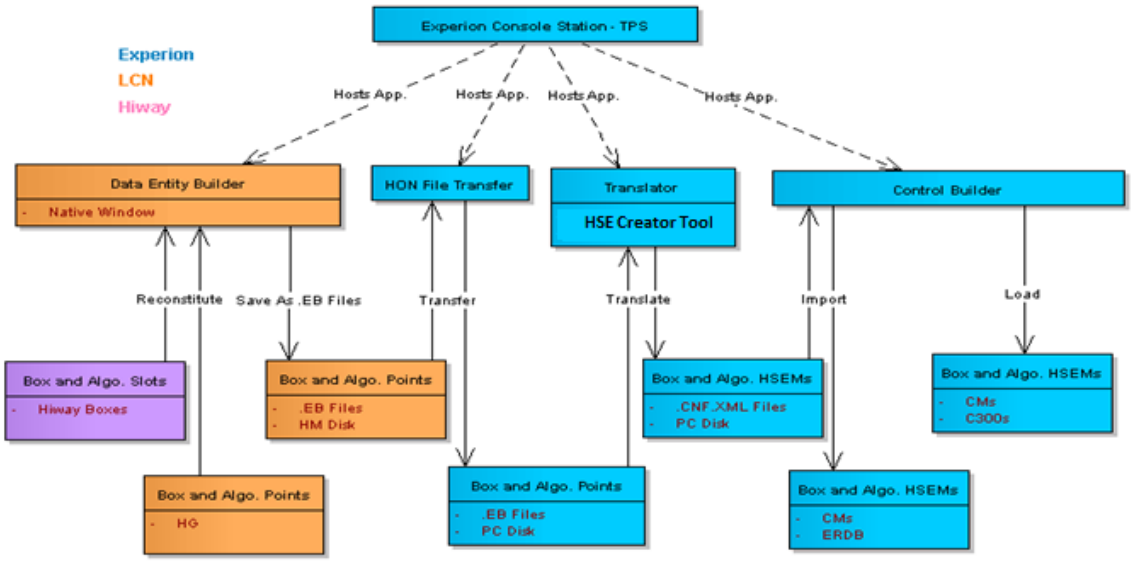


Figure 21: Illustration of translation and load process

Attention

- The HSE Creator Tool is a part of the Experion Hiway Bridge (EHB) migration solution that enables the LCN HG users to migrate from TDC-2000 to the Experion controllers and IOs, and eventually to full-Experion.You must have installed MS Office Excel 2007 and Access Database engine to use the HSE Creator Tool.

  Note
  It is recommended to use MS Office Excel 2007.

- Hiway box configuration must be translated first and then imported into the Experion engineering repository database using Control Builder either before the slot HASE or along with the slot HASE.
- To translate Hiway slot configuration, the .EB files of the HG box points as well as the HG algorithm points must be present in the source file directory.
- Of the CM or CMs that make up the Hiway Algorithm Slot Emulation (HASE), the algorithm CM tag name is identical to that of HG algorithm point that was translated. HASE is a set of Control Modules which emulate the functionality of a Hiway Algorithm Slot.
- Hiway Box Slot Emulation (HBSE) names are identical to the Hiway boxes that were translated except that the “$” prefix is replaced with “_”. HBSE is a Control Module which emulates the functionality of a Hiway Box Slot.

9.1 Creating new emulations

Application engineers can create an emulated box configuration or an algorithm slot emulation which never existed on a physical Hiway.

To create emulations of Hiway box slots

1. Using the Data Entity Builder, configure and load the box in the HG if the box is not present.
   For more details on creating a box, refer to the TPN documentation.
2. Create the .EB file for the box.
3. Transfer the .EB file from the HM/LCN to the computer that has HSE Creator Tool installed by using the TPS File Transfer Utility.
4. Using the HSE Creator Tool, translate the box .EB file into .cnf.xml files.
   For more information about translation using the HSE Creator Tool, refer to the *Hiway Slot Emulation Creator User Guide*.
5. Import the .cnf.xml files into the Experion engineering repository database using Control Builder.
6. Load the .cnf.xml files from the Control Builder.
   Ensure that the box status is displayed as OK on the Hiway Gateway Network Status Display. This implies that the communication is established.

To create emulations of Hiway algorithm slots

1. Create an HG point with the box number that you created.
   a. Configure the point with HG_Hiway.
   b. Create the point configuration from the Data Entity Builder.
2. From the Command menu, use the **WRITE TO IDF** option to write this point to IDF.
   The point is stored in the IDF.
3. From the Command menu, use the **READ TO PED** option to view the point details in the PED.
4. Modify the load destination (LOADDEST) as “HG” and load.
5. Using the TPS File Transfer Utility, transfer the .EB files (point configuration) from the HM/LCN to the computer that has the HSE Creator Tool installed.
6. Using the HSE Creator Tool, translate the .EB files into .cnf.xml files and assign IO channels appropriately as described in the Hiway Slot Emulation Creator User Guide
7. Import the .cnf.xml files into the Experion engineering repository database using Control Builder.
8. Load the .cnf.xml files to the Experion C300 Controller.

> **Attention**
> In order to load a HASE to a C300 controller, the corresponding HG Point must already be present within the EHB.

For more information about loading, refer to the Experion *Control Building User's Guide*.

9.1.1 Creating emulations in Remote EHB

When EHB has a remote HG relationship with a box emulation then complete the following steps to create emulations.

To create emulations in remote EHBs

1. Using the Data Entity Builder, configure and load the box (for example, Box 35) with Boxassn = THISHG in LCN1 in the HG.
   For more details on creating a box, refer to the TPN documentation.

2 Using the Data Entity Builder, configure and load the box (for example, Box 35) with Boxassn = RemoteHG in LCN2.

3 Perform the following steps for Box 35 (on the LCN1 network) from Control builder:

   a Create the .EB file for the box.

   b Transfer the .EB file from the HM/LCN to the computer that has HSE Creator Tool installed by using the TPS File Transfer Utility.

   c Using the HSE Creator Tool, translate the box .EB file into .cnf.xml files.

   For more information about translation using the HSE Creator Tool, refer to the *Hiway Slot Emulation Creator User Guide*.

   d Import the .cnf.xml files into the Experion engineering repository database using Control Builder.

   e Load the .cnf.xml files from the Control Builder.

   Ensure that the box status is displayed as OK on the Hiway Gateway Network Status Display. This implies that the communication is established.

4 Configure a point in Box 35 from LCN1. Load the Algorithm HRB for the configured point from Control Builder on LCN1 network. For more information about creating and configuring the point, refer to the procedure, **To create emulations of Hiway algorithm slots** in “Creating new emulations” on page 83.

Note
While configuring the point on LCN1, ensure that the Load destination = HG_Hiway.

5 Create an HG point from LCN2 with the box number that you created.

   a Configure the point with Load destination = HG.

   b Create the point configuration from the Data Entity Builder.

9.2 Modifying emulations

You can modify the configuration of an existing emulated point. If the point is translated and loaded into Experion, and you want to modify the configuration parameters, perform the following steps.

Attention

It is not recommended to edit the EB file.

- If the modification required is on ALFMT (Alarm format), the EB file should be edited to include the applicable trip points before translation. Similarly, if OPALEN is to be modified, OP trip points must also be included in the EB file.
- By default, the PVFormat will be D1 for non-linear PVCHAR. PVFormat will be set to DO on the emulated point if the following conditions exist:
  - The total PVEU range (EUHI – EULO) is greater than 1069
  - The EUHI or EULO is beyond -1069 or 1069.

It is recommended not to attempt to modify the parameters like PVEULO/PVEUHI/PVCHAR using any TPN means of data access like the Detail Displays.

The emulation blocks (HASE, HBSE) can be changed only from the Control Builder of Experion.

To modify emulations

1. Build the box Exception Builder (EB) file if it does not exist.
2. Reconstitute the point to be modified.
3. From DEB, change the required values of the configuration parameters.
4. From the Command menu, use the **WRITE TO IDF** option to write the point configuration to IDF.
5. Create the .EB file for the point by using the Print IDF entities from the command menu.
6. Copy the Box EB file and point EB file to the machine that has the HSE Creator tool installed.
7. Import and then translate the .EB file into .cnf.xml files using the HSE Creator Tool. For more information about Translation, refer to *Translating HG algorithms to Experion emulation strategies* in the *Hiway Slot Emulation Creator User Guide*.

   Attention

   In the **EB File Input Obtained From** section on the Translation tab, ensure that you select **Emulated Hiway Devices**.

   You must select this option when the .eb files have been obtained by reconstituting from HG points over emulation slots. Selecting this option prevents the conversion from Interactive to Noninteractive PID tuning constants from being applied a second time when the starting values are already Noninteractive.
8. Perform IOM assignment. For more information about Assigning IO channels, refer to *About IO channel assignment* in the *Hiway Slot Emulation Creator User Guide*.
9. Import the emulations into the Experion engineering repository database.

   Note

   While importing, use the Import with Overwrite option.
10. Load the .cnf.xml files to the Experion C300 Controller.

    Attention

    The algorithm type of an emulation cannot be modified by making changes directly within the emulation CMs. Instead, the procedure of translate-and-load must be followed, using the steps indicated above, but taking care to change the algorithm type and the associated parameters after reconstituting from the existing emulation.

Example

Assume that a temperature transmitter (which does not have any capability to apply linearization as needed by temperature measurement using thermocouples) is to be replaced with a smart transmitter with linearization.

1. Reconstitute the point and create the EB file.

   You can also modify the control configuration parameters by editing the EB file.
2. Using the HSE Creator Tool, translate the EB file in to the cnf.xml file.
3. Configure new strategy using the cnf.xml file.
4. Load the emulations.

   When you load the emulations, changes are applied to the point as per the resulting new EB. In this example, the parameter changed is PVCHAR.

   The parameter changes are recorded in the parameter change journal of TPN. You can also observe that the linearization using TEMPCHAR CAB block is removed from the Experion control strategy.

   The parameter value of PVCHAR is retained as is in the HG. The characterization is applied in Experion through the TEMPCHAR CAB block. This is done by the HSE Creator Tool.

- For information about reconstituting a point, refer to the *Data Entity Builder Manual* from the TPN documentation set.
- For information about translation, refer to the *Hiway Slot Emulation Creator User Guide*.
- For information about loading emulations, refer to the *Control Building User's Guide* and "Loading/ reloading of emulations".

9.3 Guidelines for modifying HASEs

9.3.1 Guidelines for modifying LCN configuration parameters

Attention

It is recommended that you do not modify parameter values from the Experion view. If you do so, undesirable consequences might occur.

If any configuration change is required, the HG point must be re-translated and the HASE must be reloaded.

The following table lists some of the consequences that might occur if you attempt to modify the configuration parameter values .

Parameter name	Suggestions to user at LCN/CEE native block/HRB	Emulated Behavior at LCN	Emulated Behavior CEE Native block
PVFORMAT PVCHAR PVEULO PVEUHI PVTEMP CTLEQN INPTCOND ALFMT ALGIDDAC PSTMODE INITCONF ITHILM ITLOLM SPEUHI SPEULO RCASENB SENSTOP SPCHAR SPTEMP SPFORMAT	Configuration parameters within the HASE are fixed and should not be changed from the HG point on the LCN.	An attempt to change a configuration parameter on an HG point faceplates and emulation results in the following behavior: The values in the emulation are not changed. The Network Access Fail error is displayed on the HG Detail Display page.	These parameters cannot be individually changed on the emulation CM without disrupting its operation.

9.3.2 Parameters that cannot be modified in Emulations

Some parameters, which could be modified from the physical points are restricted for modification in emulated points. The following table provides information about these parameters.

Box type	Algorithm name	Configuration parameters(Can be modified at HG point but not in CEE)	Tuning parameters (Can be modified at HG points but not in CEE)
EC/CB	Common for all algorithms	CTLEQN INITCONF SHEDMODE SENSSTOP RCASENB PVFORMAT PVCHAR SPFORMAT SPCHAR ALFMT INPTCOND	TFCHLM TFCLLM PVEUHI PVEULO SPEUHI SPEULO INTHI INTLO DEVHHHTP DEVHHTP DEVLLLTP DEVLLTP
EC/CB	PIDNORM PIDGAP PIDERSQG PIDERSQI PIDCM PIDCMA PIDDDC PIDDDCSP PIDRATIO AUTRATIO AUTOBIAS	Only common parameters	Only common parameters
EC	CHARACT	SECTOT	Only common parameters
EC	LOGIC	GATETYP1 GATETYP2 GATETYP3	Only common parameters
CB	OVERHISL, OVRDLOSL	SGNLTY12 SGNLTY34 SGNLTY56 SGNLTY78	Only common parameters
EC	EXTRATBI	PVTRACK	Only common parameters
EC	DAS MASSFLOW	Only common parameters	Only common parameters

Box type	Algorithm name	Configuration parameters(Can be modified at HG point but not in CEE)	Tuning parameters (Can be modified at HG points but not in CEE)
CB	CBSUMR SUMRWMAN SQRT SQRTPROD SUMSQRT DAS DIVIDR	Only common parameters	Only common parameters
CB	AUTOMAN LEADLAG MULT MULTWMAN	Only common parameters	Only common parameters
EC	AUTOMAN	Only common parameters	Only common parameters
EC	SWITCH	Only common parameters	PVTRACK
EC	RAMPSOAK	Only common Parameters	Offset1 Offset2
EC	LEADLAGM,LEADLAGS	Only common Parameters	Only common Parameters
EC	ECSUMR	Only common Parameters	PVTRACK
EC	DEADTM	Only common Parameters	DEADTIME

10 Performing a Cold cutover

Prerequisites

- Ensure that the TPS File Transfer Utility is installed on the EST or ESVT.
- Ensure that the CEE C300 name, which is required during translation is identified or known.
- Prior to translation, ensure that the IOM channel name is known or identified for all the HART IO modules.
- Ensure that the C300 controllers and the IO modules are mounted in the appropriate locations where the field cables will be rerouted from the HG boxes.
- During Box Cutover from Hiway to FTE, the outstanding alarms generated from physical box remain in alarm summary as orphan entries. To avoid unresponsive alarms in the alarm summary, set the Alarm Enable State (ALENBST) of all the points built on the box that is being replaced to INHIBIT. Restore the Alarm Enable State of these points after the box cutover is completed and $BOXNTWK is moved to FTE.

Database conversion for cutover

1. Create the .EB file for the box.
2. Using the TPS File Transfer Utility, transfer the .EB file from the HM/LCN to the computer that has the HSE Creator tool installed.
3. Open the HSE Creator Tool from **Start** > **All Programs** > **Honeywell Experion PKS** > **EHB** to translate the box .EB file into .cnf.xml files.
4. Translate the .EB files according to the methodology described in the *Hiway Slot Emulation Creator User Guide*.
5. Import the .cnf.xml files into the Experion engineering repository database using Control Builder.
6. Load the Box.cnf.xml files into the Control Builder. You can perform this step while loading the point files to Control Builder.
7. Create .EB files for all the points.
8. Using the TPS File Transfer Utility transfer the .EB files (point configuration) from the HM/LCN to the computer that has the HSE Creator tool installed.
9. Translate the .EB files into .cnf.xml files and assign IO channels as described in the *Hiway Slot Emulation Creator User Guide*.
10. Import the control strategy (.cnf.xml) files into the Experion engineering repository database using Control Builder.
11. Load the .cnf.xml files to the Experion C300 Controller.

> **Attention**
> In order to load a HASE to a C300, the corresponding HG Point must already be present within the EHB.

For more information about loading, refer to the Experion *Control Building User's Guide*.

To perform a Cold cutover

1 Using the Data Entity Builder, for the Hiway, change the value of the $EHBNTWK parameter appropriately as follows and load:

- Change the value to **FTE** for a Simple Gateway configuration.
- Change the value to **HWY_FTE** for a Junction Gateway configuration.

Note
$EHBNTWK of type enumeration ($EHBNTWK_ENM) is a Hiway parameter in the Hiway configuration page, which is used to specify the network path that is active on an EHB node. For more information about this parameter, refer to the TPN documentation set.

On the Hiway Network Status display, FTE STS is displayed as RUN and EHB NTWK is displayed as HWY_FTE for Junction Gateway configuration and FTE for Simple Gateway configuration.

2 On the Hiway Network Status display, click **BOX CMND**. On the Box Command page, change the box status from **FULL CTRL** to **BASIC CTRL**.

3 Reconstitute the box and change the value of **Trend Memory** to No.

4 On the Network Hiway Status, click **Box CMND**. On the Box Command page, change $BOXNTWK to **FTE** for the Hiway box.

A confirmation message, “Change $BOXNTWK to “FTE” ? (Y/N)” appears. Entering **Y** changes the value of the parameter. Entering any other value cancels the operation.

For more information about the box and Hiway reconfiguration, refer to the *HG Implementation Guidelines(HG12-610)* in the TPN documentation set.

Note
$BOXNTWK of type enumeration ($BOXNTWK_ENM) is a parameter used to indicate the current network and to switch the box from Hiway to FTE network after the control loops are migrated from a Hiway controller to Hiway emulations running in C300 controllers. For more information about this parameter, refer to the TPN documentation set.

Attention
The procedures discussed in this chapter are also applicable for Remote EHBs. However, for Remote EHBs, ensure that you perform the tasks in the following order:

1. Perform all the tasks specified in the procedure, **To perform a cold cutover**, on LCN1.
2. Perform the following tasks on LCN 2:
   a. Configure and load the EHB platform block.
   b. On the Network Hiway Status, click **Box CMND**. On the Box Command page, change $BOXNTWK from **HWY** to **FTE** for the Hiway box.

5 Ensure that the BOX STATUS is displayed as OK on the Hiway Gateway Network Status Display. This implies that the communications is established.

The Box Status display indicates ‘E’ in white color beside the box number that is configured in an FTE network.

6 Reroute all the field I/O wiring from the HG box to the C300 I/O modules as planned. For more information about Series C I/O planning and design , refer to the *Series C I/O User's Guide*.

7 Perform a loop check out, and tune adjustments for each loop as required.

8 Change the box status from **BASIC CTRL** to **FULL CTRL** to reform the AM communication.

11 Performing a Hot cutover

This chapter provides information about performing a hot cutover:

11.1 About the Cut-over Management display

Hot cut-over is facilitated with a HMI display, Cut-over Management display. The Cut-over Management display enables the operator to maintain the access to view and control the cut-over process during the transition from physical HG boxes (CB and EC) to emulated boxes. This display focuses on supporting process operation during the transition of a box in a box-by-box method of hot cut-over.

This display can be accessed by the maintenance engineer and operators.

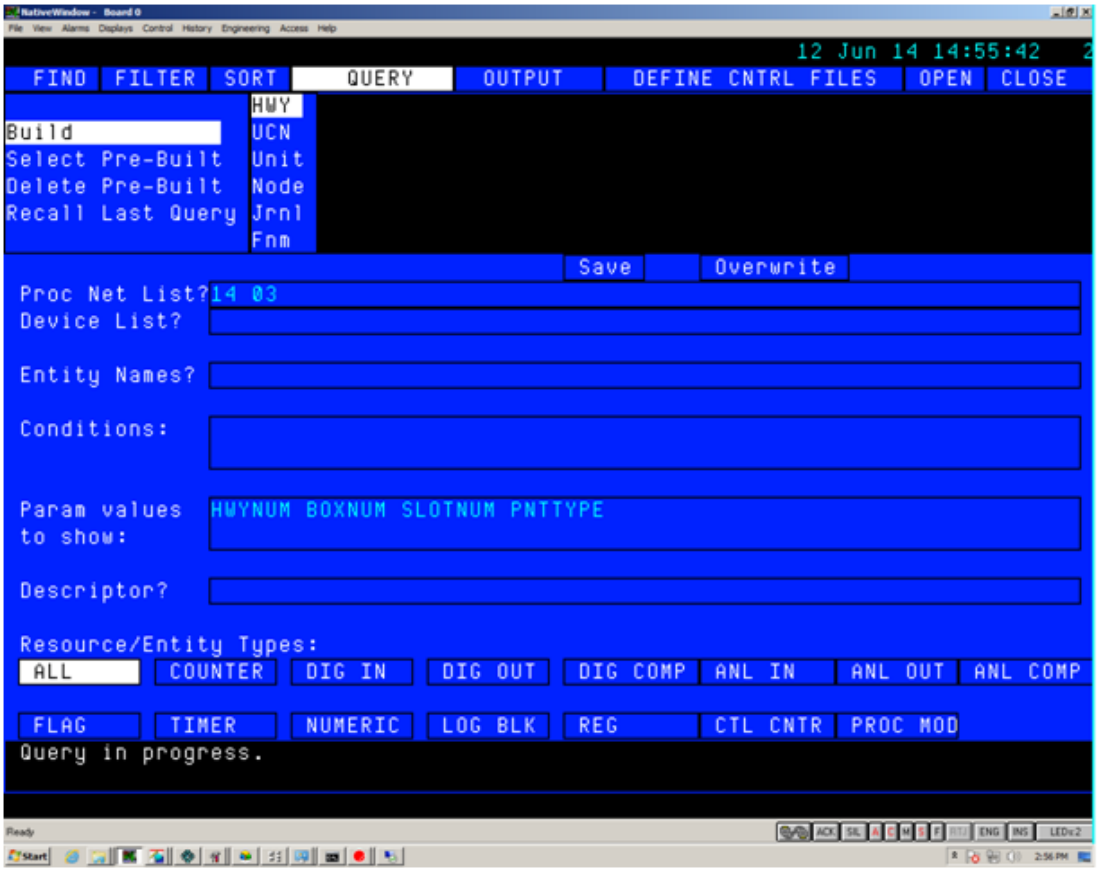
The display has two major sections:

- The top section shows parameters read from HG points through TPN communications. The values of these parameters originate from the slots of the physical Hiway box. The parameters are shown within point faceplates in a view similar to that of a Native Window group display. This view is operative as long as field wiring remains attached to the legacy box which is being migrated.
- The bottom section shows parameters read from C300 Control Modules through Experion CDA communications. The values are taken directly from the emulation CMs which will replace the physical Hiway slots and which will be shown through the HG points after the box migration has been completed. The parameters are shown within a group-display like view which has a distinct look and feel from the top section. This view becomes operative one slot at a time, as field wiring is moved from the legacy box to the replacement C300.

Tag list

The Cut-Over Management display uses a list of tag names to correlate Hiway boxes with their associated HG points. Before calling up the display for the first time, maintenance engineers must run a query in the DocTool, as displayed in the following figure. Running this query, populates a tag list. The tag list file, **HGTAGLST.XX**, must be saved in \Honeywell\Experion PKS\Client\System\R430\ on the server, all flex stations, and all the consoles.

Search is initiated for all the Hiways together. Therefore, this file must be available in physical servers, secondary servers, consoles, and stations on which the display might be used. Every time the HG number and box number is specified on the display, the tag list is used.



Starting the Cut-Over Management Display

The Cut-Over Management Display can be invoked as follows:

In the Station Command area, enter the display file name (syshsectmgtb) and press Enter. When you are invoking it for the first time, you must enter the Hiway number and the Box number.

If the HGTAGLST.XX file is not saved in the \Honeywell\Experion PKS\Client\System\R430\ location, the following error is displayed:

"**Error encountered while trying to launch the cut-over dispay. Please check for HGTAGLST.XX and try again.**"

The details of the point based on the Hiway number and Box are populated. The slots are arranged in ascending order from left to right. Details of the point appear in the first 8 slots. In EC boxes where there are more than 8 slots, click **Next** to access the details of the remaining 8 slots.

The information in this display will persist as long as the station is not closed. Navigating away from this display and returning later shows the information for the same tag. Box selection and tag list/slot order populated is preserved even after the station is restarted.

Attention

Ensure that you enter appropriate details of the Hiway and Box number because you will not be prompted with error messages if you enter an unconfigured box/Hiway number.

Cut-Over Managements Display interface

The following figure is a sample of the Cut-Over Management Display interface. It consists of two arrays of 8 face plates in two rows.

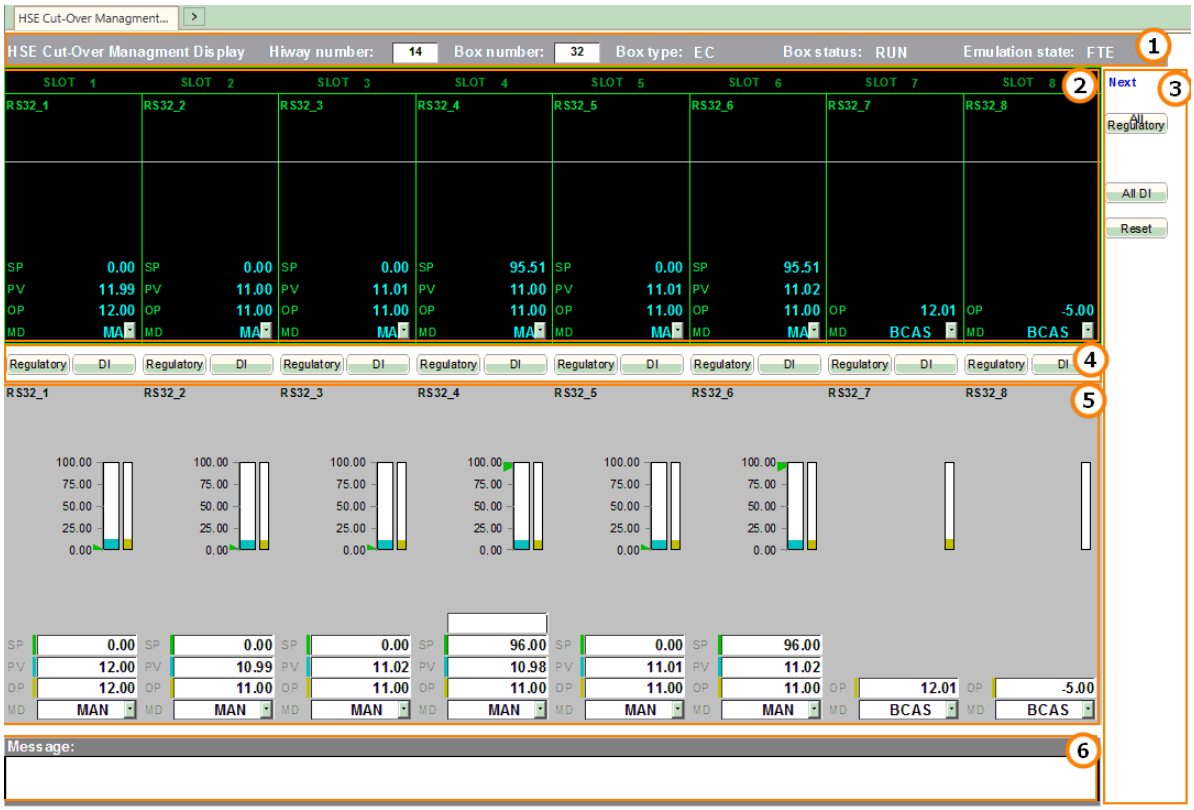


Figure 22: Sample Cut-Over Management Display interface

Item	Description
1	Section 1 provides options to specify the Hiway number and the Box number. It also displays the Box Type and the Emulation state.
2	Section 2 consists of 8 face plates (LCN) and lists the parameter details by accessing it from TPN. The slots are displayed in ascending order. However, you can re-position the slots per your preference. In each slot, the following details are populated: • Tag name and description • Parameter details **Note** If there are more than 8 slots, you must click **Next** to access the details of the remaining face plates.
3	Section 3 consists of the following buttons: • All Regulatory - Enables you to view details of the regulatory points on all the slots • All DI - This button is active only for EC algorithms. It enables you to view details of DI points on all the slots. • All RVAI - This button is active only for CB algorithms. It enables you to view details of RVAI points on all the slots. **Note** The box type in the preceding illustration is EC. Therefore, All RVAI is not displayed. • Reset - Resets the display view. If new tags are added in the

Item	Description
4	Section 4 presents the following options: • Regulatory • RVAI - This button is active only for CB algorithms. This button appears only if you have configured RVAI. Click this button if you want to access the details of the RVAI point on a slot. **Note** The box type in the preceding illustration is EC. Therefore, All RVAI is not displayed. • DI - This button is active only for EC algorithms. Click this button if you want to access the details of the DI point on a slot.
5	Section 5 consists of 8 face plates with the look and feel of an Experion HMI Web group display and lists the parameters by accessing values from the Experion function blocks. RV and DI are also displayed in this section. • Tag name and description • Parameter details • Bar chart
	It also consists of navigational options, **Next** and **Previous**. These options are enabled only if the number of slots are more than 8.
6	Section 6, **Message**, is an editable field where you can add important information for reference.

Parameters in the display

Each slot displays parameter details, which are dynamically populated. The parameter details vary depending on the algorithm type.

However, the following are the details displayed for each slot:

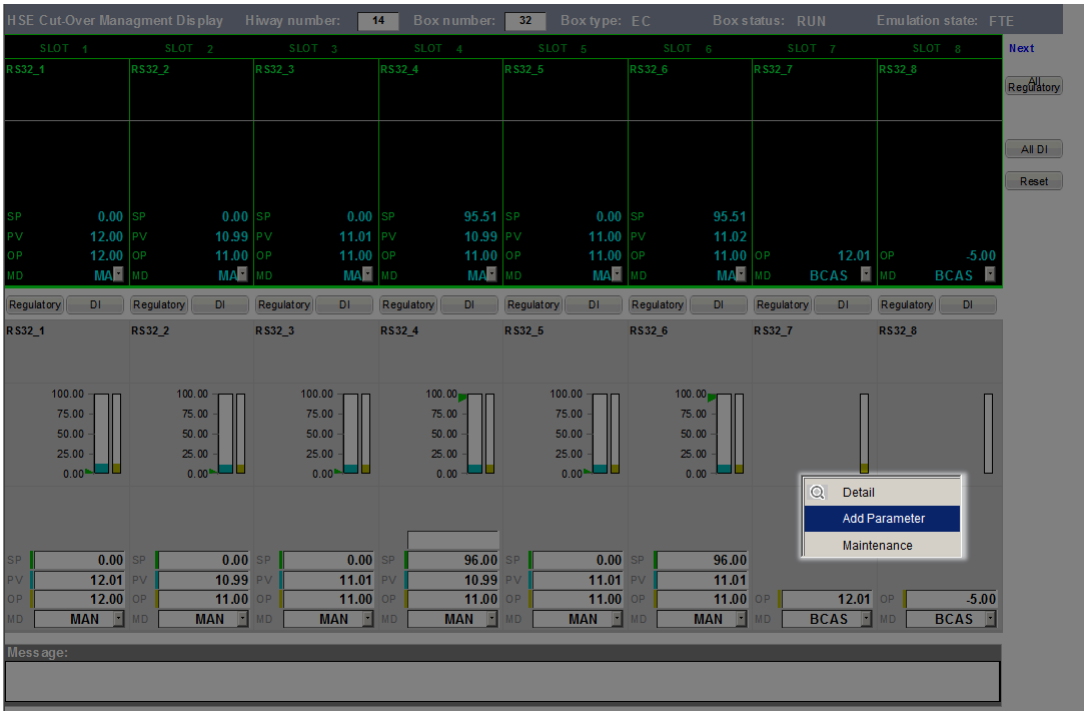
- Mode
- Parameters based on the algorithm type

Adding parameters

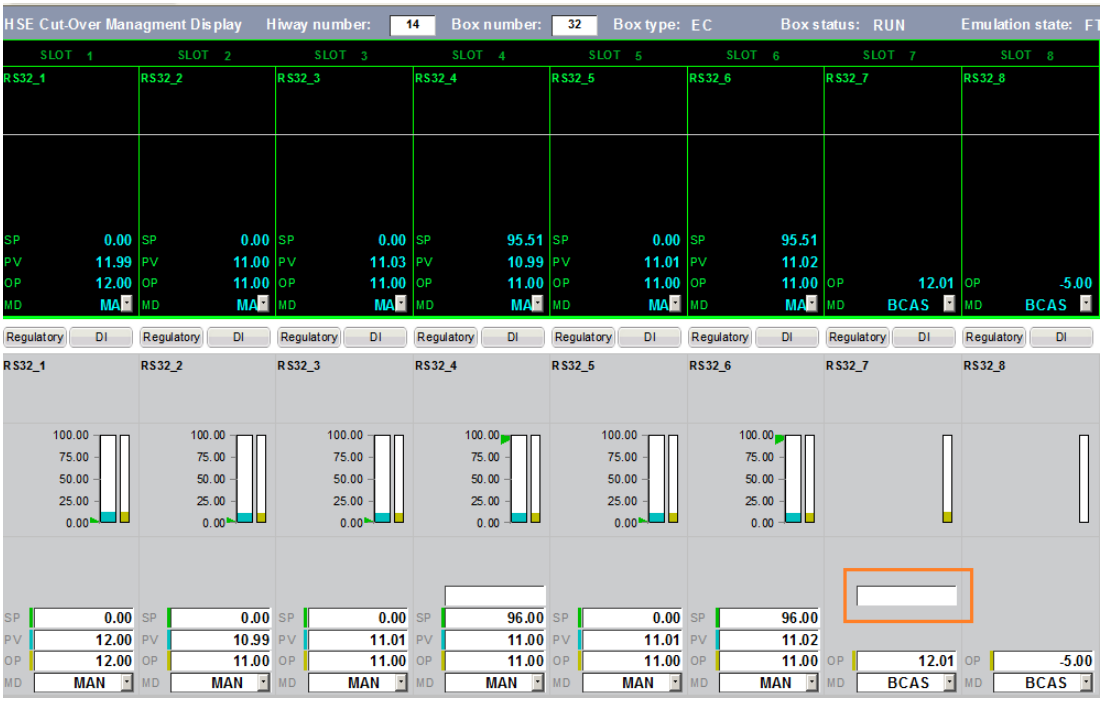
In the bottom row, you can add another parameter per your requirement.

To add another parameter to the existing list:

1. On any of the displayed slots, right-click on the gray background beside the displayed parameters.
2. From the shortcut menu, click **Add Parameter**.



3. Add the details of the required parameter.



11.2 Cut-over process monitored on the Cut-Over Management Display

The following procedure provides the sequence of steps performed during the process of cut-over using series C IO and reconnecting field devices from the BOX Terminal blocks (of physical Hiway box terminals) to Series C IO modules. This section takes you through the various changes related to the parameters on the Cut-Over Management Display during the process.

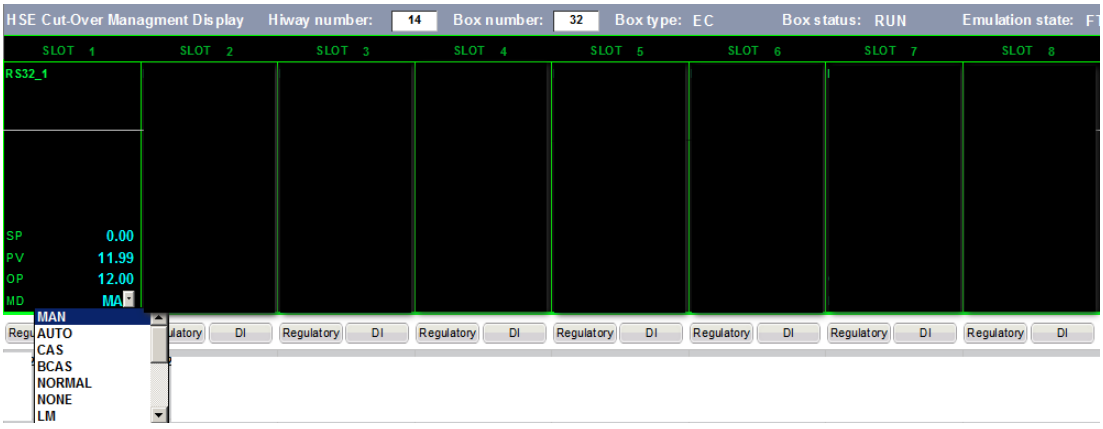
CB box is considered as an example in this procedure. The CB box is operating in a physical Hiway box with Mode = AUTO.

Prerequisites

- Ensure that the TPS File Transfer Utility is installed on the EST or ESVT.
- Ensure that the CEE C300 name, which is required during translation is identified or known.
- Prior to translation, ensure that the IOM channel name is known or identified for all the HART IO modules.
- Ensure that the C300 controllers and the IO modules are mounted in the appropriate locations where the field cables will be rerouted from the HG boxes.
- During Box Cutover from Hiway to FTE, the outstanding alarms generated from physical box remain in alarm summary as orphan entries. To avoid unresponsive alarms in the alarm summary, set the Alarm Enable State (ALENBST) of all the points built on the box that is being replaced to INHIBIT. Restore the Alarm Enable State of these points after the box cutover is completed and $BOXNTWK is moved to FTE.
- Perform the steps discussed in the section in “Performing a Cold cutover” on page 91, which includes translating all .eb files reconstituted from the box (including the box point itself and all algorithm points.). As part of the translation, perform I/O channel assignment as described in the *Hiway Slot Emulation Creator User* guide. Load the .cnf.xml files to the Experion C300 Controller.
- The Cut-Over Management display uses a list of tag names to correlate Hiway boxes with their associated HG points. Before calling up the display for the first time, maintenance engineers must run a query in the DocTool. For more information, refer to the topic *Tag list* in “About the Cut-over Management display” on page 94.
- Change the $EHBNTWK parameter for the Hiway appropriately in the Data Entity Builder. It is changed to FTE for a Simple Gateway configuration and HWY_FTE for a Junction Gateway configuration.
- Reconstitute the box and change the value of Trend Memory to No.

1. Invoke the Cut-Over Management Display. Enter the Hiway number and Box number. Revise the slot order if required. The Emulation Status is displayed as **HIWAY**.

   The field wiring can be moved in any slot order chosen at the site. For purposes of the description below, the order is assumed to go from slot 1 to slot 8.
2. Switch the box control state from **FULL CTRL** to **BASIC CTRL**.
3. Change the mode in Slot 1 to manual (MAN) in the top row of the faceplate.



4. Remove the field wiring from Slot1. The value of PV changes to the default value.
5. The field wiring of Slot1 is connected to the C300 input module.
6. Verify proper operation and tuning of the emulation, which is now connected to the field wiring.
7. Repeat steps 2, 3, 4, and 5 for all the slots.
8. On the Network Hiway Status, click **Box CMND**. On the Box Command page, change the $BOXNTWK to **FTE** for the Hiway box.

Note

A confirmation message, “Change $BOXNTWK to “FTE” ? (Y/N)” appears. Entering **Y** changes the value of the parameter. Entering any other value cancels the operation.

9. After the cut-over, the Emulation status is displayed as **FTE**. You can change the mode of the slots from MAN to AUTO. When the mode in Slot 1 is changed to **AUTO**, all the values in the top row matches with the values in the bottom row.
10. After all field wiring has been moved and the Emulation State has been changed to FTE, box control state can be switched from **BASIC CTRL** to **FULL CTRL** when site personnel are ready.

11.3 About the Cut-Over Maintenance Display

The cutover operation provides the maintenance engineer an operator view of the process parameters of the box during cutover while altering any engineering parameters.

The Cut-Over Maintenance Display, is a pop-up display invoked from the Cut-Over Management Display. It helps the maintenance engineer to view, maintain, and alter key identified process parameters during the transition from physical HG boxes (CB and EC) to emulated boxes. The access level required to access and operate this display is Engineer access level.

The Cut-Over Maintenance Display supports adjustment of tuning parameters. Tuning parameters will have been pre-computed to the best available starting values as part of the translation process. But if the engineer finds that adjustments are needed during the process of cutover, they can be made through the Cut-Over Maintenance Display.

Invoking the Cut-Over Maintenance Display

Prerequisites

To invoke and operate the Cut-Over Maintenance Display, you must have a station access level of Engineer or higher.

Cut-Over Management Display is invoked on station.

Note
If you have signed in with an access level below engineer then Maintenance display options will be disabled and you can not launch the Cut-Over Maintenance display.

To invoke the Cut-Over Maintenance Display, perform the following steps:

1. On the bottom row of faceplate right-click on any particular slot.
2. From the shortcut menu, click **Maintenance** to start the Cut-Over Maintenance display.

   The menu also provides options to Add parameters

Cut-Over Maintenance Display interface

The Cut-Over Maintenance Display is resizable and can be repositioned anywhere on station. The title of the display is the name of the slot/point name. It lists the Tuning General option, which is used to modify tuning parameters. The displayed parameters vary depending on the algorithm type.

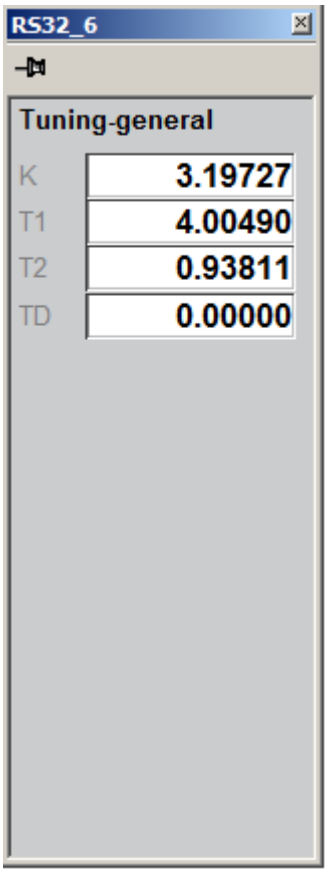


Figure 23: Cut-Over Maintenance Display

12 Operations

Related topics

“Monitoring EHB from Experion Control Builder” on page 104
“EHB detail displays” on page 108
“Saving checkpoints” on page 112
“Restoring checkpoints” on page 115

12.1 Monitoring EHB from Experion Control Builder

Related topics

“EHB platform block” on page 104
“CEEC300 block” on page 106

12.1.1 EHB platform block

The following tabs of the EHB platform block display the EHB statistics, status of the emulated algorithms, box the communication details, and the CEE communications details.

- Box Emulation tab
- Box Communications tab
- CEE Communications tab
- Statistics tab

Box Emulation tab

The following figure displays the Box Emulation tab from the Monitoring view.

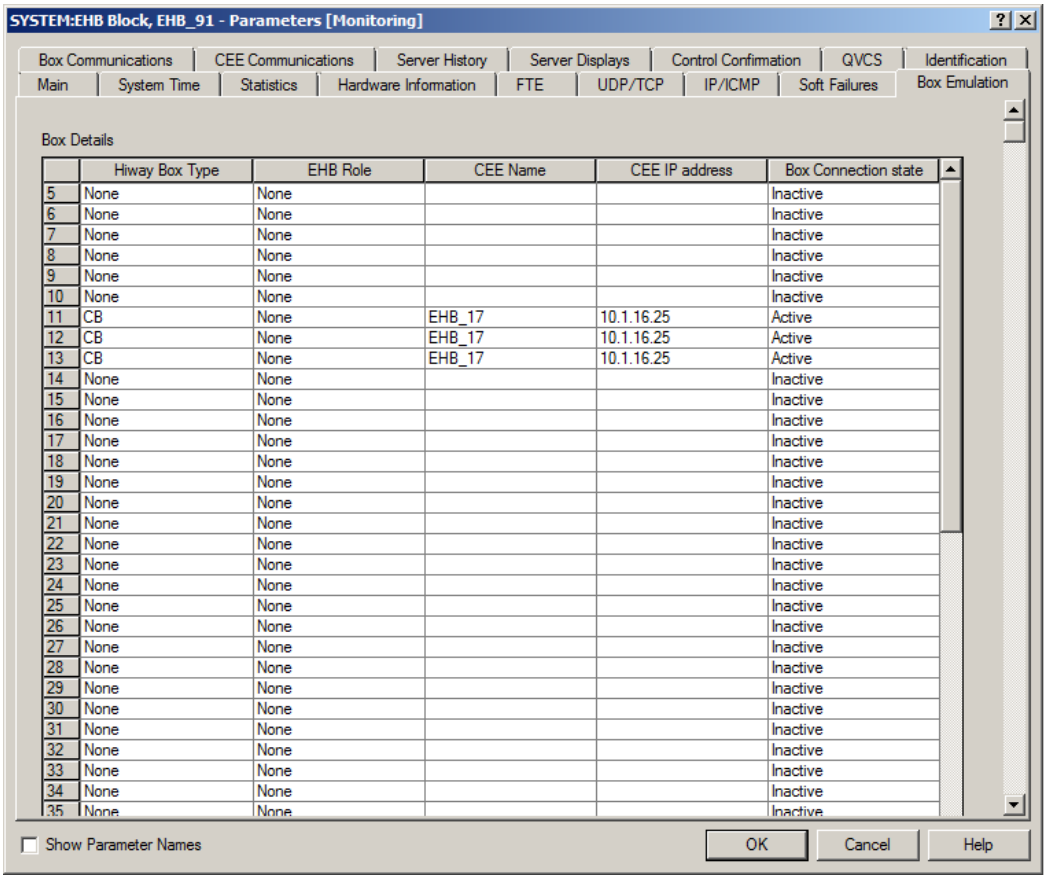


Figure 24: Box Emulation tab

The Box Emulation tab provides the following information.

- Hiway box type - Emulating box type (For example; CB)

- EHB Role - Role of the EHB (ThisEHB, AddedEHB and Remote EHB)
- CEE Name - Tag name of the C300 Controller which is emulating the box.
- CEE IP - Ethernet IP address of the C300 Controller which is emulating the box.
- Box Connection state - Active or Inactive.

Box Communications tab

The following figure displays the Box Communications tab from the Monitoring view.

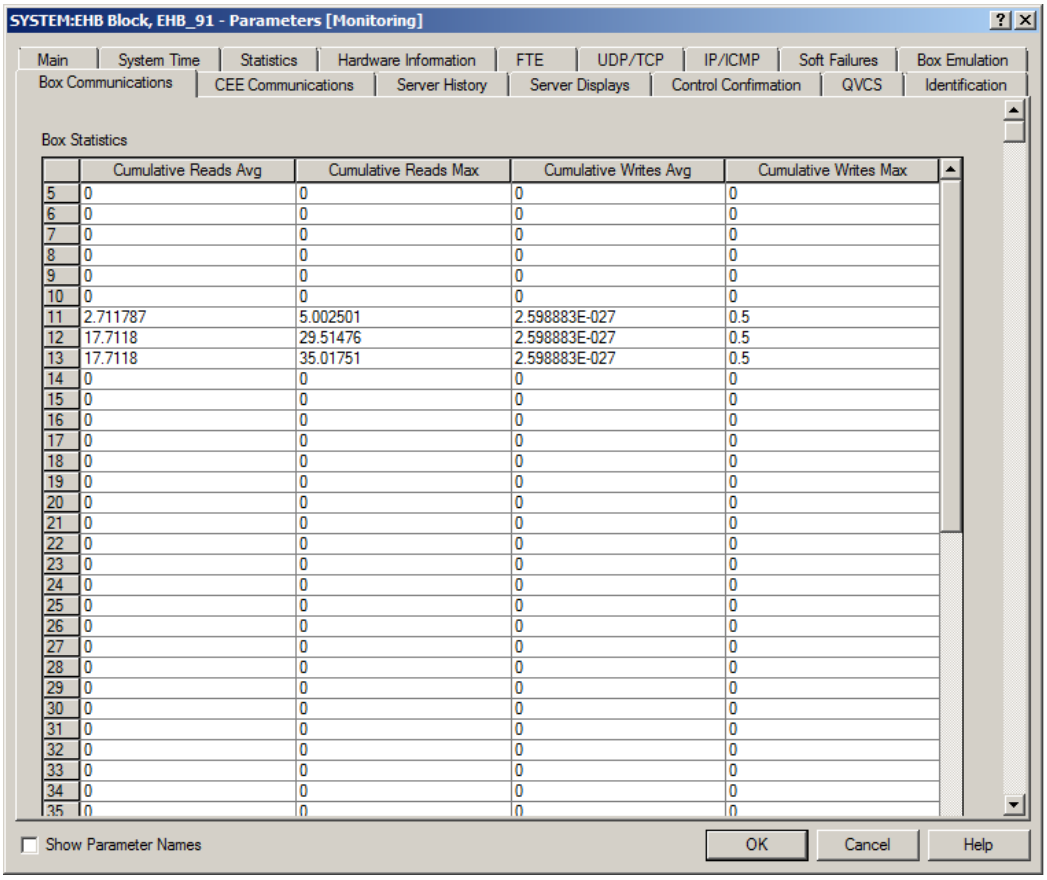
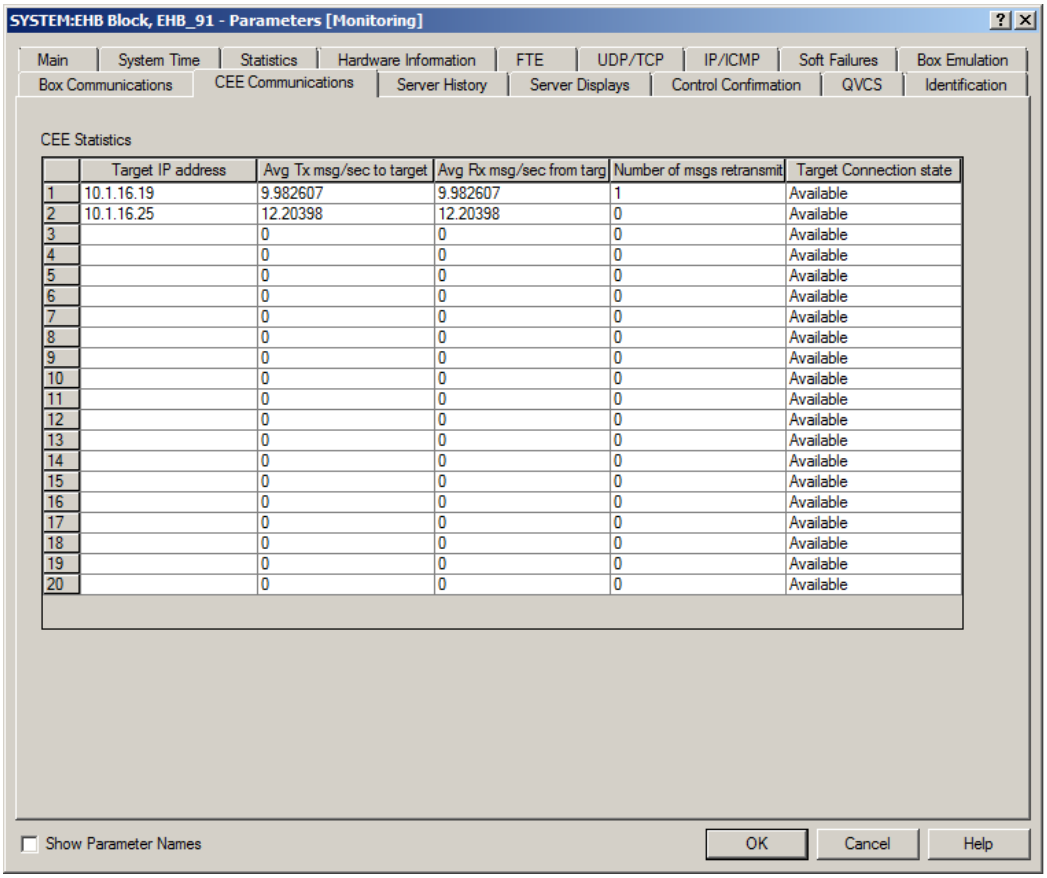


Figure 25: Box Communications tab

The Box Communications tabs displays the cumulative reads/writes average and maximum values of Hiway parameters.

CEE Communications tab

The following figure displays the CEE Communications tab from the Monitoring view.



	Target IP address	Avg Tx msg/sec to target	Avg Rx msg/sec from targ	Number of msgs retransmit	Target Connection state
1	10.1.16.19	9.982607	9.982607	1	Available
2	10.1.16.25	12.20398	12.20398	0	Available
3		0	0	0	Available
4		0	0	0	Available
5		0	0	0	Available
6		0	0	0	Available
7		0	0	0	Available
8		0	0	0	Available
9		0	0	0	Available
10		0	0	0	Available
11		0	0	0	Available
12		0	0	0	Available
13		0	0	0	Available
14		0	0	0	Available
15		0	0	0	Available
16		0	0	0	Available
17		0	0	0	Available
18		0	0	0	Available
19		0	0	0	Available
20		0	0	0	Available

Figure 26: CEE Communications tab

The CEE Communications tab displays the average number of request sent/received/resent from/to the C300 Controller.

Statistics tab

The following figure displays the Statistics tab from the Monitoring view.

The Statistics tab contains various statistical parameters of the EHB. The following parameters are added for the EHB.

- Current Hr Report FIFO Entries (CURHRRPTFIFOENTRY)
- Current Hr Error FIFO Entries (CURHRERRFIFOENTRY)
- Current Hr Receive FIFO Entries (CURHRRCVFIFOENTRY)
- Last Hr Report FIFO Entries (LSTHRRPTFIFOENTRY)
- Last Hr Error FIFO Entries (LSTHRERRFIFOENTRY)
- Last Hr Receive FIFO Entries (LSTHRRCVFIFOENTRY)

12.1.2 CEEC300 block

EHB Communications tab

The **EHB Communications** tab can be used to view the emulated Hiway boxes information and view the communication statistics information.

The following figure displays the EHB Communications tab from the Experion Control Builder Monitoring view.

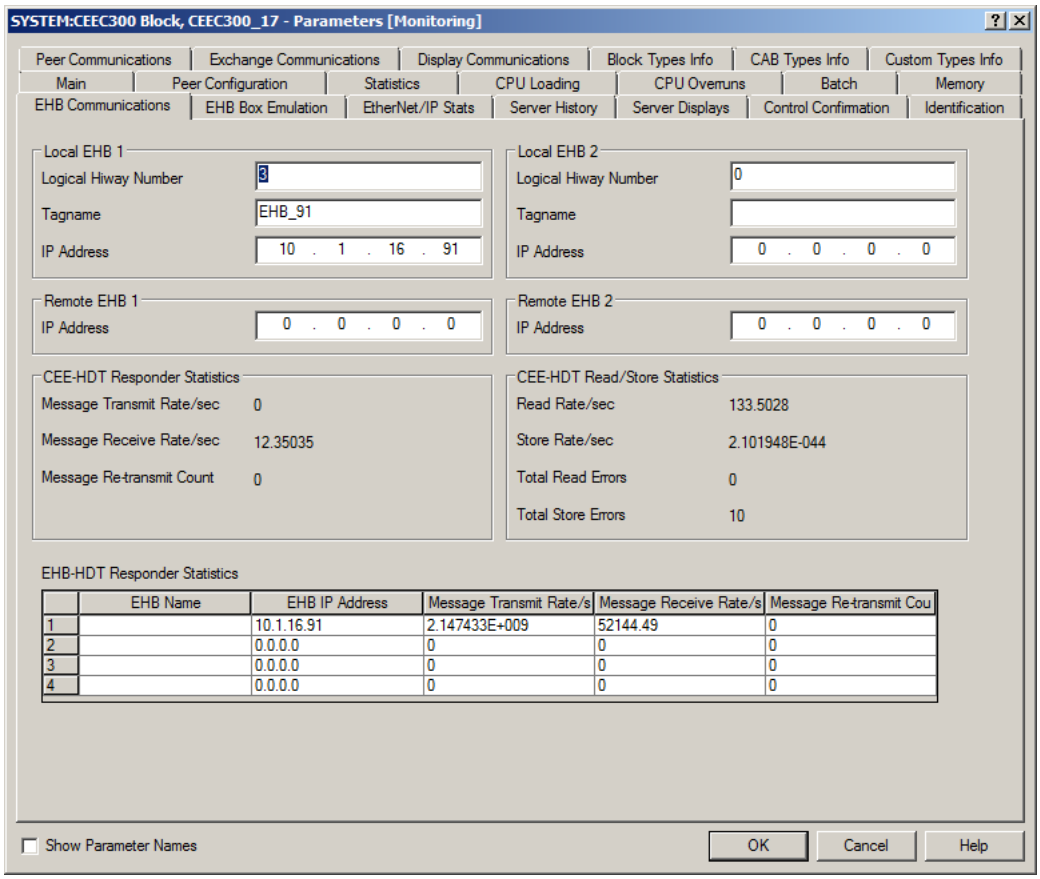


Figure 27: EHB Communications tab in Monitoring view

12.2 EHB detail displays

The following table lists the names of the details display tabs for EHB.

Tab name	Detail display
Main	sysdtlehba.htm
Box Emultaion	sysdtlehbb.htm
Soft Failures	sysdtlehbc.htm
Configuration Details	sysdtlchba_chart.htm

Detail Display tabs

Main tab

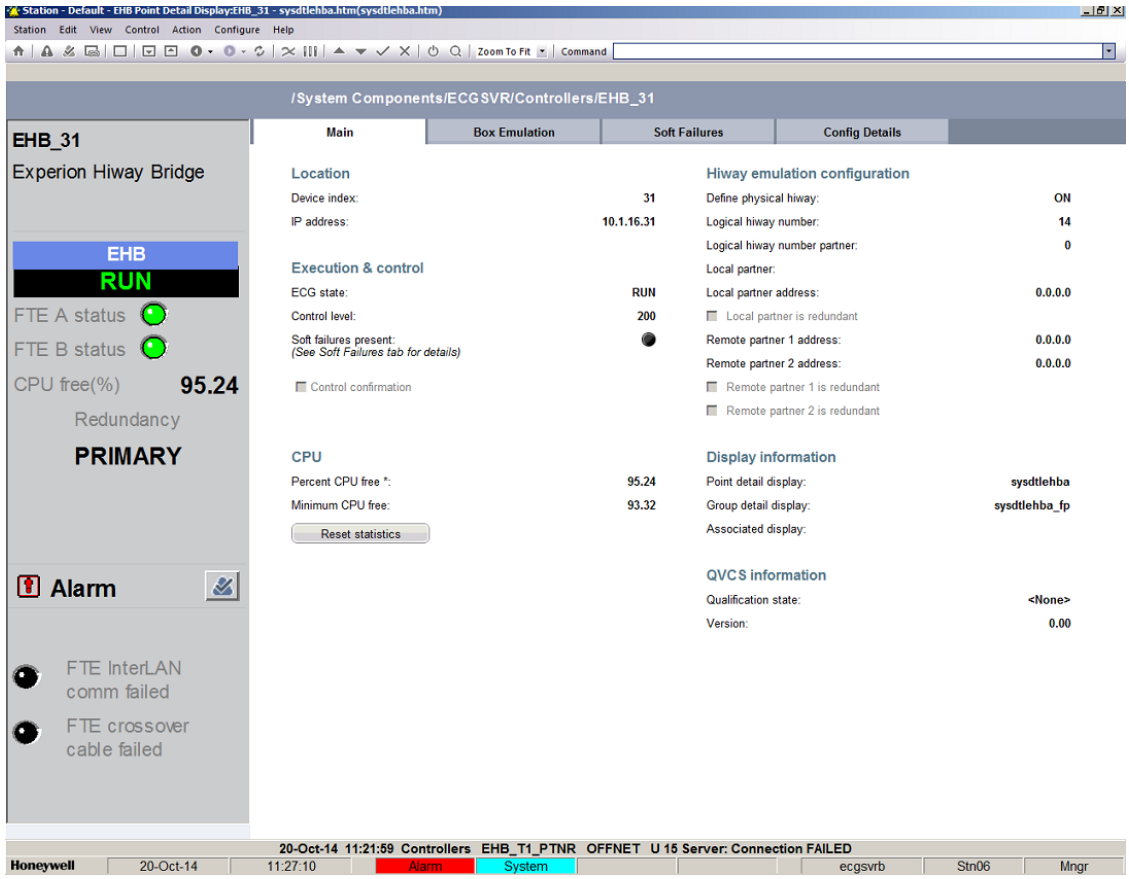


Figure 28: EHB Main tab display

Box Emulation tab

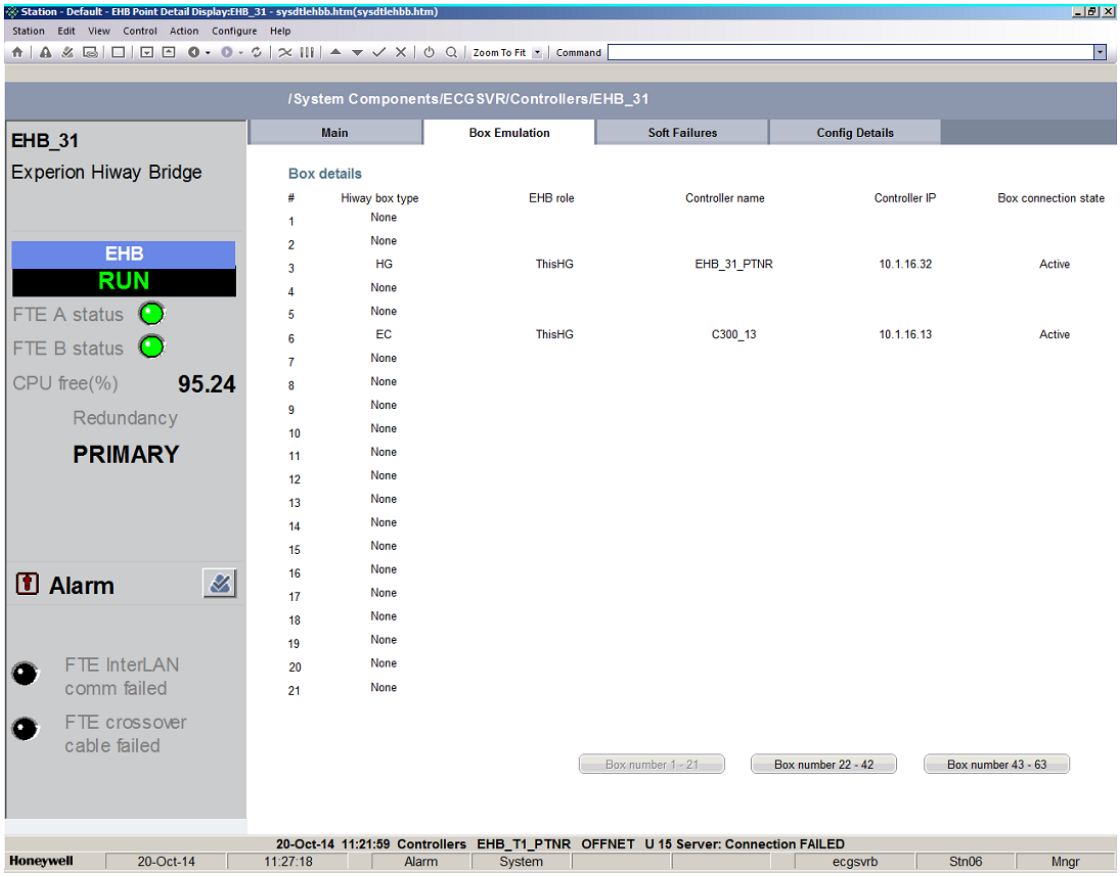


Figure 29: EHB Box Emulation tab display

Soft Failures tab

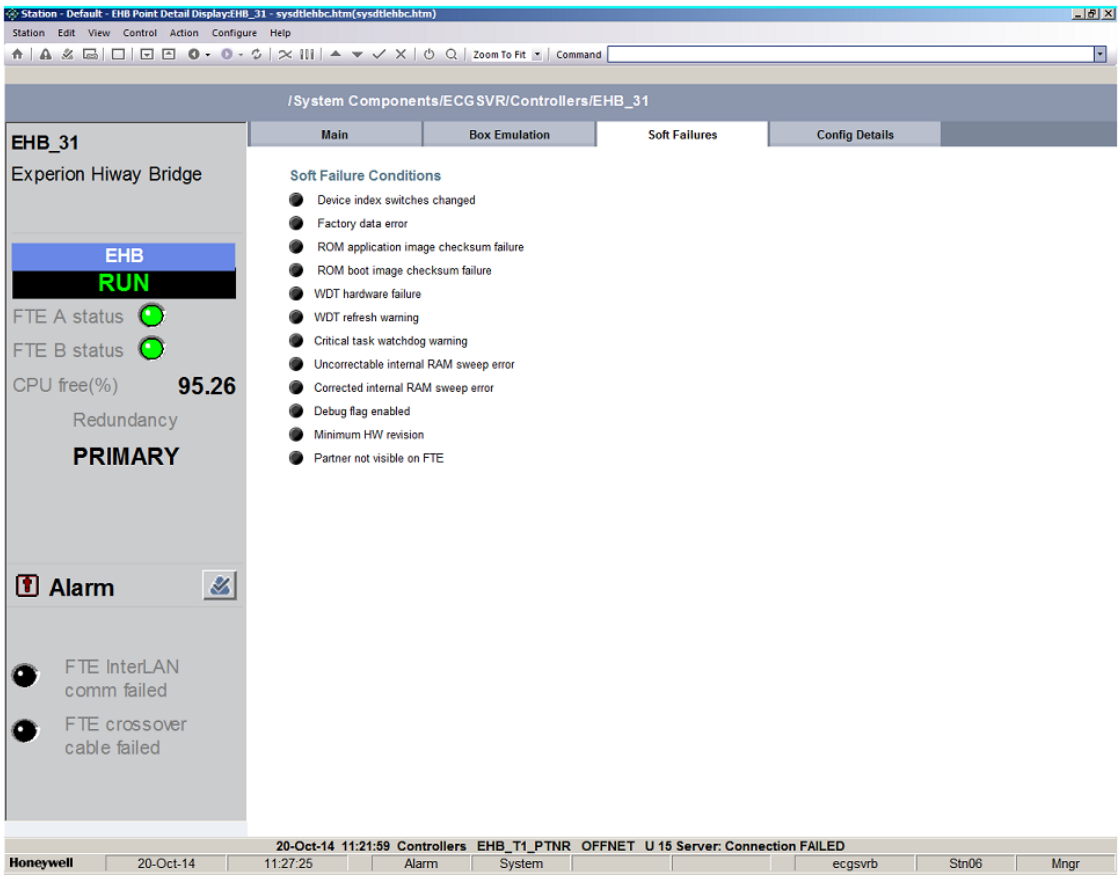


Figure 30: EHB Soft Failures tab display

Configuration Details tab

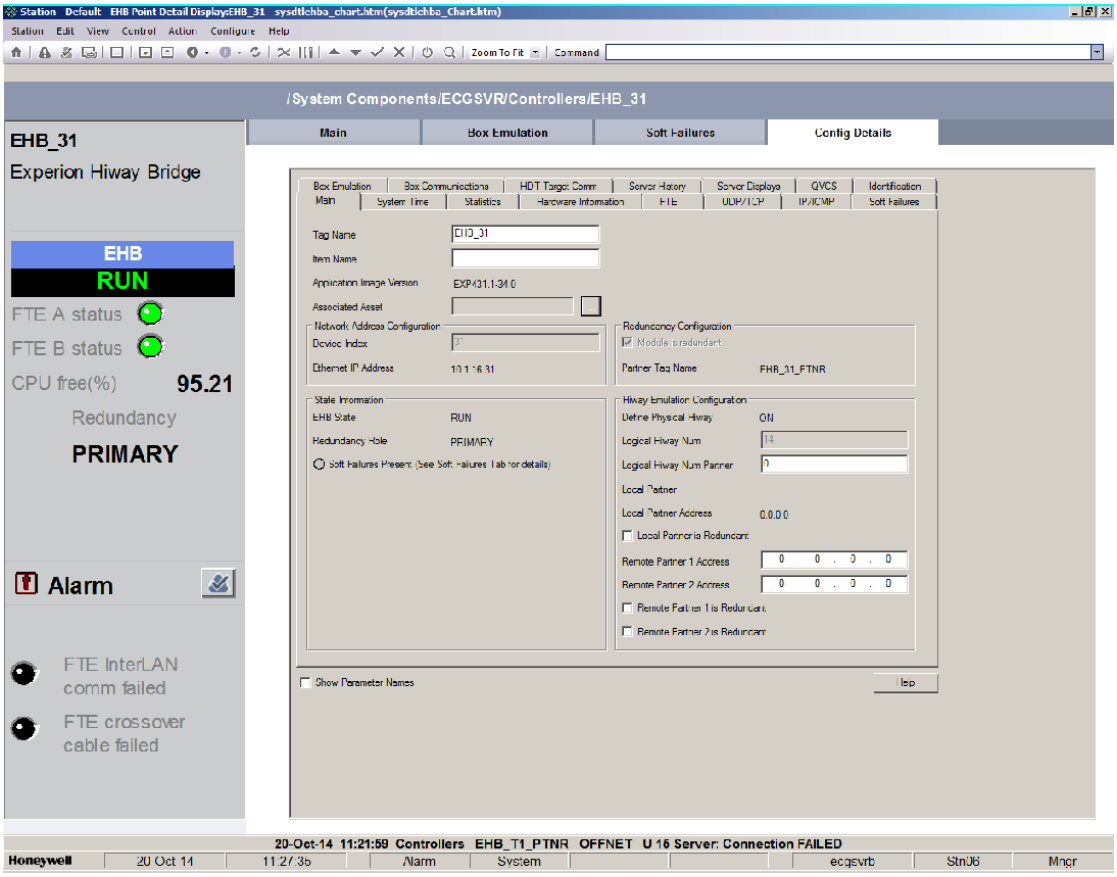


Figure 31: EHB Configuration Details tab display

12.3 Saving checkpoints

You can save checkpoints for a system with EHB by performing the following operations:

- Saving checkpoint for emulated Hiway controllers – This operation must be performed from the Control Builder and it saves emulation strategies and the EHB platform block.
- Saving checkpoint for HG/EHB – This operation must be performed from the Native window and it saves the HG points.

The Save Data function on the Hiway Status display saves both the HG resident and the box resident data in the HG checkpoint volume in the History Module, on a cartridge, or floppy disk from one or all the boxes on the Hiway. The Save Data function on the Hiway Status display supports saving emulated box resident data in the HG checkpoint. The rationale behind allowing checkpoint save is to use the **Find Names** command for searching the references between entities in the HG Checkpoint file.

Perform the following steps to save checkpoints from the Native window:

To save checkpoints for C300 from Control Builder

1 From the Monitoring window in Control Builder, select the relevant C300 controller, right-click **Checkpoint** >**Checkpoint Save Manually**.

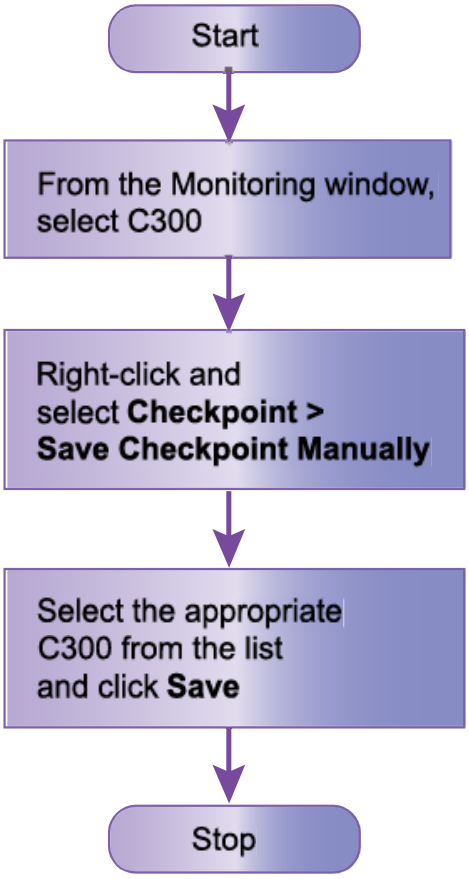
The Checkpoint save dialog box appears.

2 Select the appropriate C300 chosen for saving checkpoint and click **SAVE**.

A message dialog appears, “Please check Checkpoint save percentage from detail display of Controller from Experion Station.”

Note
You can check the status of the checkpoint save in Node Detail status. Station provides a system event after the completion of checkpoint.

The following flowchart outlines the Checkpoint Save procedure from Control Builder:



To save checkpoints from the Native Window

1 From the Native Window, perform the following steps:

1. Click on System status and select the EHB.
2. Click **SAVE SELECT** target, and press ENTER.
3. Select the DEFAULT SOURCE (or target storage media)-> EXECUTE COMMAND.

Note
If EHB is redundant, select the primary EHB.

2 Select EHB and click on NTWK\HWY status target from the System status.

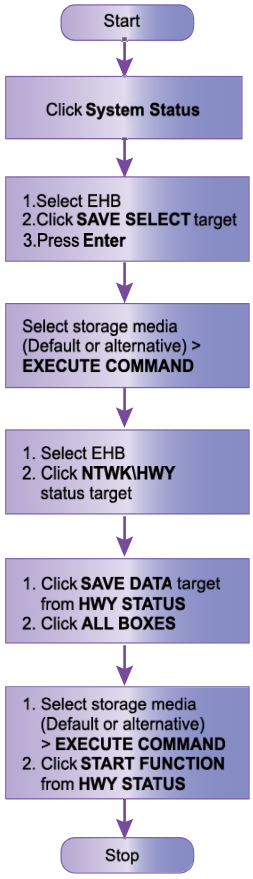
Note
If EHB is redundant, select the primary EHB.

3 Click **SAVE DATA** target from HWY STATUS and click on **ALL BOXES**.

4 Select DEFAULT SOURCE(or target storage media)-> **EXECUTE COMMAND** and then click **START FUNCTION** target from the HWY STATUS.

The status message, **SAVED**, appears against each emulated and/or physical box. The **BAD STATE** message appears for the failed (HWY Err) boxes.

The following flowchart outlines the Checkpoint Save procedure from the Native window:


Start
Click **System Status**
1.Select EHB
2.Click **SAVE SELECT** target
3.Press **Enter**
Select storage media
(Default or alternative) >
EXECUTE COMMAND
1. Select EHB
2. Click **NTWK\HWY**
status target
1. Click **SAVE DATA** target
from **HWY STATUS**
2. Click **ALL BOXES**
1. Select storage media
(Default or alternative)
> **EXECUTE COMMAND**
2. Click **START FUNCTION**
from **HWY STATUS**
Stop

12.4 Restoring checkpoints

You can restore checkpoints for a system with EHB by performing the following operations in the specified order:

1. Restoring checkpoint for emulated Hiway controllers – This operation must be performed from the Control Builder and it restores emulation strategies and the EHB platform block.
2. Restoring checkpoint for HG/EHB – This operation must be performed from the Native window and it restores the HG points.

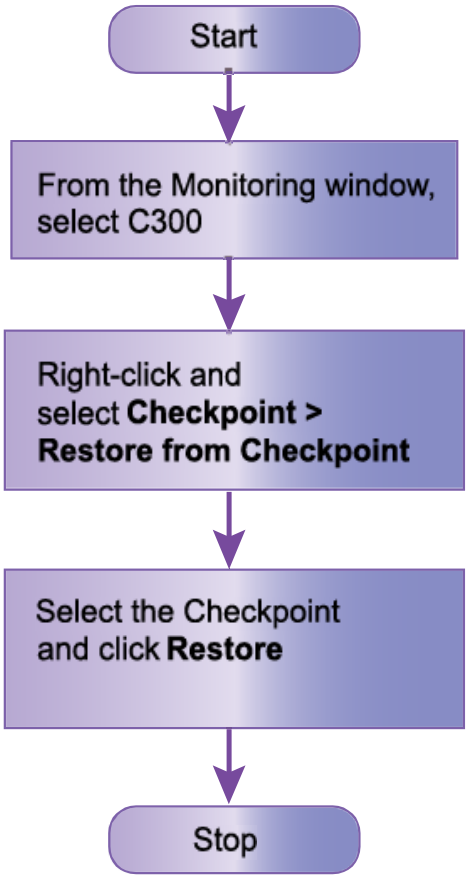
Attention

You must first restore checkpoints in Control Builder followed by restoring checkpoints from the Native window. If this order is not followed, **Hiway Err** in the Hiway status display might appear on all the emulated boxes.

To restore checkpoints for C300 from Control Builder

1 Right-click on the appropriate C300 and select **Checkpoint >Restore from Checkpoint**.
A dialog box with a list of all the available checkpoints appears.

2 Select the checkpoint which was saved manually and click **Restore**.
The following illustration outlines the procedure to restore checkpoints from Control Builder:



To restore checkpoints from the Native Window when EHB is in a POWERON/QUALIF state

1 If EHB is in a POWERON/QUALIF state, perform the following steps from the Native window:

1. Click on the Process network Node status and select the EHB.

Note
If EHB is redundant, select the primary EHB.

2. Click on LOAD target. When prompted for Data source, provide the DEFAULT SOURCE (or the source media where checkpoint was saved.)

   The status of the EHB is displayed as OK with a Warning status.

If EHB is redundant, repeat the substeps 1 and 2 for the secondary EHB.

2 After the EHB is in OK\BUP state, select the EHB and click on the NTWK\HWY status target.

3 Click on LOAD target, enter each of the physical box numbers, and select DEFAULT SOURCE (or the source media where checkpoint was saved) >**EXECUTE COMMAND**.

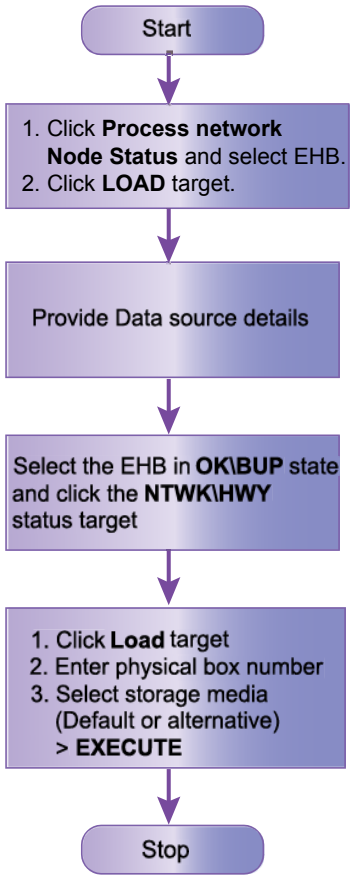
Note
LOAD box from checkpoint is not valid for emulated boxes. If the checkpoint for C300 has been restored, the status for every emulated box is displayed as OK.

4 Click **START FUNCTION**.

The status message, **RESTORED**, appears against the boxes.

Note
Physical boxes are governed by the procedures discussed in the TPN documentation set.

The following illustration outlines the procedure to restore checkpoints from the Native window when EHB is in a POWERON/QUALIF state:



13 Appendix A - Impact of CEE Idle or CM inactive and CEE restart on emulations

CEE Idle or CM inactive

When a CEE is idle or the CM is inactive, the slot emulation goes offline and no live PV is available. The PV value is reported as NaN to the HG point.

The CEE idle or the CM inactive state is considered as a box reset functionality. When CEE is idle or the CM is inactive;

- The regulatory control is “InitMan.”
- The acknowledged alarms are removed.
- The PV is reported as “Bad.”
- PATHBRKSTS is set to INOUTERR.

  For more information about PATHBRKSTS, refer to “Path Break Status” and the *Control Builder Parameter Reference*.

CEE restart

On restart, the PV value is restored to the field value and the alarm generation depends on the new PV value. InitMan on mode is removed.

14 Appendix B - Box/Algorithm state transitions and its impact

Box state transitions and its impact on box HRB, algorithm HRB and LCN view

The following table provides information on the box state transition and its impact on the box HRB, the algorithm HRB, and the LCN view.

Box State transition	Impact on Box HRB	Impact on Algorithm HRB	Impact on LCN view	Impact on active alarms
Load	• If the registration succeeds, then the load also succeeds and the HBSE can be activated. • If the registration fails, then the box load fails and the HBSE cannot be activated.	No impact	If the box registration succeeds, the box can be detected on the LCN . If Registration fails, LCN displays HWYERR in the Box status.	No alarm is active before the box load.
Reload of the HBSE without any change.	No impact	No impact	No impact	No impact on the active alarms. They remain as is.
Reload after changing the card type from “None” to some other value in PIUs.	The box continues to be registered and function normally.	No impact	No impact	No impact
Reload after changing the card type value to another value or from any value to “None.”	The box registration fails. To recover from this, the HBSE must deleted and loaded	All algorithm HRBs associated with the box go into Unregistered state.	The box cannot be detected on the LCN.	No alarms are reported since the box is not detected on the LCN.
HBSE activation	Broken link between the LCN and the HASE is re-established.	All algorithm HRBs attempt to register.	Bad upstream status like INITMAN “On” goes “Off.” PATHBRKSTS displays OK	No impact

Box State transition	Impact on Box HRB	Impact on Algorithm HRB	Impact on LCN view	Impact on active alarms
CEE Idle	No impact	Read/Write from algorithm does not work.	LCN views the link broken to downstream in terms of parameter values like INITMAN ON, MODE shed to MAN if ModeShed is applicable, and so on. PATHBRKSTS displays INOUTERR	No impact
Coldstart/ Warmstart	EC Box will reset the Watch Dog Timer	INITMAN will be set to ON. PV will be shown as BAD value if exists.	INITMAN ON, PV is displayed as BAD Value. PATHBRKSTS shows INOUTERR	No impact
Switchover	No impact	No impact	No impact	No impact
RRR	RRR	MODE will be shed to MAN if the algorithm is connected to an output channel.	MODE will be shed if the algorithm is connected to an output channel.	New alarm is reported if alarming condition persist after RRR.
Delete	The box is deleted.	All algorithm HRBs associated with the box go into Unregistered state. All communication with algorithm slot emulations ceases to function.	The box cannot be detected on the LCN and goes into error status on the Hiway status display.	Active alarms RTN.

Algorithm state transitions and its impact on the box HRB, the algorithm HRB and the LCN view

The following table provides information on the algorithm state transition and its impact on the box HRB, the algorithm HRB and the LCN view.

Algorithm State transition	Impact on Box HRB	Impact on Algorithm HRB	Impact on LCN view	Impact on active alarms
HASE Load	No impact	• If the registration with the box HRB succeeds, then it goes into registered state. • If the box HRB is not present, then it goes into unregistered state. • If there is a configuration mismatch, it goes into registration failed state.	After successful load, the algorithm loaded reflects in the LCN view. LCN view displays the algorithm type loaded.	Active alarm remain as is. New alarms, if any, with the new HASE are reported.
HASE Reload	No impact	The HRB is reloaded and the configuration changes are visible .	Configuration changes are visible.	Alarms are re-reported

Algorithm State transition	Impact on Box HRB	Impact on Algorithm HRB	Impact on LCN view	Impact on active alarms
HASE Inactive	No impact	INITMAN will be set to ON if supported by the algorithm. PV values are displayed as "----", which means bad value.	LCN views the link broken to downstream in terms of parameter values like INITMAN ON, MODE will shed if applicable. PATHBRKSTS shows INOUTERR	No impact
HASE Active	No impact	Read/Write from LCN starts working. If the algorithm supports, INITMAN will be reset from ON to OFF. PV will reflect the actual value.	Bad upstream status like INITMAN "On" changes to "Off." PATHBRKSTS shows OK	No impact
Switchover	No impact	No impact	No impact	No impact
RRR		If the algorithm is connected to an output channel, MODE will sheds to MAN.	If the algorithm is connected to an output channel, MODE will sheds to MAN.	New alarm is reported if alarming condition persists after RRR.
Coldstart/Warmstart	EC Box will reset the Watch Dog Timer	INITMAN will be set to ON. PV values are displayed as "----", which means bad value.	INITMAN is set to ON, PV is shown as BAD Value. PATHBRKSTS displays INOUTERR	No impact
CEE Idle	No impact	Read/Write from algorithm does not happen.	LCN view detects the link broken to downstream in terms of parameter values like INITMAN ON, MODE shed to MAN, and so on.	No impact
Delete HASE	No impact	The algorithm is deleted.	LCN view displays the algorithm type as "DAS" and PV values are displayed as "----" which means bad value.	No impact

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- Send an email to security@honeywell.com.

  or

- Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or Honeywell Technical Assistance Center (TAC) listed in the “Support and other contacts” section of this document.

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