

# **HCC2 Ethernet/IP:**

# Expand I/O and motor control with premapped subdevices

Save wiring time and engineering effort in setting up your HCC2 control system by selecting devices from HCC2's web-based library. Each subdevice is premapped to support inbound and outbound messaging. The HCC2's dual port Ethernet switch gives you the flexibility to use linear or redundant media topologies.

# The bottom line

The HCC2 promises flexible and scalable I/O expansion by enabling control system architectures that distribute IO across distances up to 100m (328 ft) from the controller. You reap the benefits of:

- + Reduced project design cost through reduced cable and junction box design
- + Reduced programming complexity by utilizing premapped library of devices
- + Reduced field wiring costs compared to homerun cables with junction boxes
- + Reduced downtime due to the HCC2's automatic media fault recovery

#### For more info

See the Rockwell Automation Literature library for the following guides and more for help to design and implement Ethernet/IP and DLR networks for industrial automation systems.

- + Ethernet/IP Device Level Ring Application Note
- + Converged Plant Wide Ethernet (CPwE) Design and Implementation Guide



# Ethernet/IP architecture

QRATE HCC2 Ethernet/IP protocol supports I/O expansion by using Rockwell Automation FLEX<sup>™</sup> I/O, FLEX 5000<sup>®</sup> I/O, and PowerFlex<sup>®</sup> VFDs.

HCC2 functions as an Ethernet/IP Scanner that owns the remote Ethernet/IP Adapters. A single HCC2 can own the configuration and connection to multiple adapters. In turn, each adapter can connect multiple I/O modules.

When designing an HCC2 control system with Ethernet/ IP, you must consider the total number of connections.

The HCC2 allows a maximum of 32 connections.

Each adapter and I/O module consumes at least one connection. You can add a maximum of eight I/O modules to a single FLEX<sup>™</sup> I/O or FLEX 5000<sup>®</sup> I/O Adapter.

The HCC2 supports Ethernet/IP devices connected to linear, star, and ring architectures. Each architecture has specific design considerations.

#### Linear architecture

A Linear topology connects Eth-3 and Eth-4 ports to adapter modules. You can connect one adapter to each port. Connecting two adapters allows you to add up to 16 I/O modules.

#### Star architecture

When building a Star topology, use an Ethernet switch. You can use an unmanaged switch for a small network. However, we recommend a managed switch to support advanced network features.

#### **Ring architecture**

Use a Ring architecture for a redundant media topology. HCC2 supports DLR protocol on Eth-3 and Eth-4 only.

When implementing the HCC2 in a Ring topology, consider the following design points:

- + You cannot configure the HCC2 as a Ring supervisor.
- + You must configure at least one Ring supervisor for the ring to function. Therefore, to ensure proper functionality, set one of the Ethernet/IP devices on the network as the Ring supervisor.
- You can use Rockwell Automation RSLinx software to configure an adapter as a DLR supervisor. The FLEX 5000<sup>®</sup> I/O pn. 5094-AENTR is one Ethernet/IP adapter that can perform the Ring supervisor function.
- + When designing a DLR ring, add devices that you can configure as Ring supervisors, such as
  - 1783 ETAP/ETAPK/ETAP1F/ETAP1FK/ETAP2F/ ETAP2FK
  - Stratix Switches 5200/5400/5700/5800
- + Configure a Ring supervisor before connecting the final Ethernet cable to complete the ring to prevent broadcast storms.

See the <u>Ethernet/IP Device Level Ring Application Note</u> for more DLR design and configuration information.

#### **Configuring Unity Edge Subdevices**

Use the Unity Edge configuration tool to set up adapters and I/O modules. Configure Unity Edge so that it matches the Ethernet/IP adapter and IO module layout of the system design.

If you are familiar with configuring Ethernet/IP devices in Studio 5000 Logix Designer, you will find similarities with the Unity Edge configuration tool.



Linear architecture



Star architecture



**Ring architecture** 

#### **Configuring Unity Edge Subdevices**

Use the Unity Edge configuration tool to set up adapters and I/O modules. Configure Unity Edge so that it matches the Ethernet/IP adapter and IO module layout of the system design.

If you are familiar with configuring Ethernet/IP devices, you will find similarities with the Unity Edge configuration tool.

See the table below for the pre-defined adapters and I/O modules that you can add as Unity Edge subdevices.

1794 FLEX I/O, 5094 FLEX 5000 I/O, 1426-M8E Power Monitor 5000, and various PowerFlex VFDs are premapped to the HCC2 subdevices library. The 1794 and 5094 adapters are indicated as XT, but the non-XT version of the adapter also works.

	Catalog Number	Description
Adapters	1794-AENT	1794-AENT Ethernet Flex Adapter
	1794-AENTR	1794-AENTR FLEX Ethernet Flex Adapter
	5094-AEN2TRXT	5094XT Ethernet Adapter 16 Modules RJ45
	1426-M8E	PM5000
	PowerFlex 525 DataLinks	PowerFlex 525-EENET AC Drive with Configurable DataLinks
	PowerFlex 525-E	PowerFlex 525-E via 20-COMM-E
	PowerFlex 700H-E	PowerFlex 700H-E AC Drive via 20-COMM-E
	PowerFlex 700S	PowerFlex 700S 2P-400V Phase 2 AC Drive via 20-COMM-E
	PowerFlex 755 DataLinks	PowerFlex 755-ENETR AC Drive with Configurable DataLinks
	PowerFlex 755	PowerFlex 755-ENETR AC Drive
	PowerFlex 755T VHz DataLinks	PowerFlex 755T ControlMode VHz V1.0
	PowerFlex 755T DataLinks	PowerFlex 755T Drive with Configurable DataLinks V4.7
	PowerFlex 755TR DataLinks	PowerFlex 755TR Drive with Configurable DataLinks V2.3
IO Modules for	1794-IA16/A	1794-16 Point 120V AC Input
Flex IO Adapters	1794-IA8/A	1794-8 Point 120V AC Input
	1794-IB10XOB6/A	1794-10 Input/ 6 Output 24V DC, Sink/Source
	1794-IB16/A	1794-16 Point 24V DC Input, Sink
	1794-IB16D/A	1794-16 Point 24V DC Diagnostic Input Module
	1794-IB32/A	1794-32 Point 24V DC Input, Sink
	1794-IB8/A	1794-8 Point 24V DC Input, Sink
	1794-IE4XOE2/B	1794-4 Input/ 2 Output 24V DC Non-Isolated Analog
	1794-IE8/B	1794-8 Channel 24V DC Non-Isolated Voltage/Analog Current Input
	1794-IE8H/B	1794-8 Channel HART Analog Current Input
	1794-IF2XOF2I/A	1794-10 Input/ 6 Output 24V DC, Sink/Source
	1794-IF41/A	1794-4 Channel 24V DC Isolated Analog Input
	1794-IF8IH/A	1794-8 Channel HART Analog Current Isolated Input
	1794-IJ2/A	1794-2 Input Frequency Module
	1794-IRT8	1794-8 Channel 24V DC RTD/Thermocouple Analog Input
	1794-OA16/A	1794-16 Point 120V AC Output
	1794-OB16D/A	1794-16 Point 24V DC Diagnostic Output Module
	1794-OB16P/A	1794-16 Point 24V DC Protected Output, Source
	1794-OB8EP/A	1794-16 Point 24V DC Electronically Fused Protected Output, Source
	1794-OE4/B	1794-4 Channel 24V DC Non-Isolated Voltage/Analog Current Output
	1794-OF41/A	1794-4 Channel 24V DC Isolated Analog Output, Source
	1794-OF8IH/A	1794-8 Channel Isolated Analog HART Output
	1794-OW8/A	1794-8 Point Relay Output, Sink/Source
I/O Modules for	5094-IB16XT	Digital Input
FLEX 5000	5094-IF8XT	Analog Input
Adapters	5094-OF8XT	Analog Output
	5094-OW8IXT	Relay Output

# **Procedure: Subdevice Configuration**

To configure subdevices, connect to the HCC2 using an Ethernet, WiFi, LTE, or USB-C connection. Log into the Unity Edge interface with Administrator or Technician credentials. Other user accounts do not support subdevice configuration.

The following procedure shows how to add a Flex 5000 adapter with a 16 point input module.

#### **Adding an Adapter**

1. In the Unity Edge interface, select Deploy > Subdevices to access the Subdevices configuration screen.

UNITY EDGE		Q Deploy	🞯 Operate 🔒 User Management	6 亡 出 《
HCC2 Sales Demo	Deploy > Subdevices			Device Local Time: 29-Jan-2024 22:47:28
V DEVICE				
Device Information Time & Location Display Units Network Configuration	EtherNet/IP Scanner			
APPLICATION SELECTION				
ISAGRAF				
SUBDEVICES				
> SYSTEM				
> DATA LOGGER				
> PROTOCOLS				
DEPLOY				

2. Click Add in the left-hand column (1) and select the 5094-AENTRXT adapter in the Add Subdevices list on the right (2).

UNITY EDGE		🔇 Deploy 🧭 Operate 🛛 R User Manageme	nt	
Asset Name 🕛 🤇	Deploy > Subdevices			Device Local Time: 13-Jan-2024 23:23:40
V DEVICE		Q ×		
Device Information	EtherNet/IP Scanner	: Catalog	Variant	Description
Time & Location	<b>(</b> )	(+) 1704.AENT	Standard	1794.AFNT Ethernet Elev Adenter
Display Units		⊕ 1794-AENTR		1794-AENTR FLEX Ethernet Adapter
Network Configuration			Standard	5094 Ethernet
APPLICATION SELECTION		5094-AENTR		5094 Ethernet
ISACDAE	2	⊕ 1426-M8E	T2_Data-ExtConfg	
IDAORAF		PowerFlex 525 DataLinks		
SUBDEVICES		PowerFlex 525-E		PowerFlex S2S-E via 20-COMM-E
> SYSTEM		PowerFlex 700H-E		
> DATA LOGGER		PowerFlex 700S		PowerFlex 700S 2P-400V Phase 2 AC Drive via 20-COMM-E
> PROTOCOLS		PowerFlex 755 DataLinks		
DEPLOY		PowerFlex 755		
		PowerFlex 755T VHz DataLinks		
		PowerFlex 755T DataLinks		
		PowerFlex 755TR DataLinks		
				Close
				Next
sensia V 1.3.207-build.4625				

3. Click the AENTR adapter in the column on the left (1) and complete the IP address field on the right (2).

UNITY EDGE			🗟 Depioy 🧭 Operate 🛛 R. User Managemen	*	0 ±
Asset Name 🕛 🔇	Deploy > Subdevices				Device Local Time: 13-Jan-2024
~ DEVICE					
Device Information	61 - 11 - 10 A	AENTR			
Time & Location	Etherneu in Scatner	: General A	ssemblies Explicit Alarms		
Display Units			Description		
Network Configuration			5094 Elhernet		
APPLICATION SELECTION			Instance	Major Rev. Minor Rev.	
ISAGRAF					
SUBDEVICES •					
> SYSTEM			Electronic Keying		
> DATA LOGGER					
> PROTOCOLS					
DEPLOY					
			IP address	RPI	
		2	192.168.1.3	500.000 ms	
					Cancel Update Deployment File Update Deployment an

The IP address must be on the same subnet as the Eth-3 and Eth-4 ports and this subnet cannot be used by any other port. Each HCC2 port requires its own subnet, as shown below.

Port	Acceptable Subnet Configuration
Eth-1	192.168 <mark>.20</mark> .5
Eth-2	192.168 <mark>.2</mark> .41
Eth-3/Eth-4	192.168 <mark>.1</mark> .33
WiFi	192.168 <mark>.5</mark> .50

Port	Unacceptable Subnet Configuration	
Eth-1	192.168.20.5	
Eth-2	192.168. <b>1</b> .41	subnet 192.16
Eth-3/Eth-4	192.168. <b>1</b> .33	two or more
WiFi	192.168.5.50	

subnet 192.168.1 cannot be shared by two or more ports

4. To make diagnostic tags available for selection, click the Assemblies tab and select the tags you want to be available for consumption in another app. Click the Assembly checkbox to select all tags in the list.

UNITY EDGE				🗟 Deploy 🔘	Operate 📌 User I	Management		
HCC2 Sales Demo	C Deploy > Subdevices							
V DEVICE								
Device Information	✓ EtherNet//P Scanner	Genera	Assemblies	Frolicit Alarms				
Time & Location	AFNTR (5094.AFNTR)							
Display Units			Assembly	Assembly Offset	Description	Data Type	Tag Publish	
Network Configuration								
APPLICATION SELECTION								
ICAGOAC								
ISAGRAF								
SUBDEVICES .								
> SYSTEM					Port2Autonegotiatio_			
> DATA LOGGER								
> PROTOCOLS								
DEPLOY								
bereor								
					CIPLostPackets			
					HMIPacketRate			
		122						
								1

5. Leave the Explicit and Alarms tabs unchanged. They are not required to enable Ethernet communication.

### Adding an I/O Module to the Adapter

1. Click the adapter name in the left-hand column (1) and select the 16-point input module from the Catalog list on the right (2).

Austinent				🔯 Deploy	🞯 Operate 🛛 鬼 User Management			õtt 🖇
Setvel Decision Deploy Unis Network Configuration APPLCATION SELECTION Subdravies Settime Se	Asset Name	C Deploy > Subdevices					Devi	e Local Time: 14-Jan-2024 00:31:5
Device information   Thre & Location   Display this   Network Configuration   APPLICATION SELECTION   SubJack   SubJack   SubJack   SubJack   SubJack   SubJack   Deriver   SubJack   Deriver   Deriver   Deriver   Deriver   SubJack   Deriver   Deriver   Deriver     Deriver	✓ DEVICE							
Time & Location   Display Units   Network Configuration   APPLICATION SELECTION   Iscaare   Subservectso   > system   > bartA Longoer   > Protocol.S   DEPLoy   Dervision Core	Device Information	Phone and the Comment	: 0					
Display Units   Network Configuration   APPLICATION SELECTION   Exastif   SUBDIVICES*   > SYSTEM   > DaTA LOGGER   > PROTOCOLS   DEPLOY   Code	Time & Location	AENTR (5004.AENTR)		2				
Network Configuration     APPLICATION SELECTION     ISAGRAF     SUBDEVICES *     > SYSTEM   > DATA LOGGER   > PROTOCULS   DEPLOY     OEPLOY     Cose	Display Units			Catalog		Variant	Description	
APPLICATION SELECTION       Introduction of the selection of the sel	Network Configuration		Add	<ul> <li>5094-IB16X1</li> <li>5094-IE8XT</li> </ul>		Standard	Analog Input	
ISAGRAF       Standard       Relay Output         SUBDEVICES 0       Standard       Relay Output         D ATA LoodeR       PROTOCOLS       PROTOCOLS         DEFLOY       DEFLOY       Conce	APPLICATION SELECTION		Delete					
SUBDEVICES *  S SYSTEM  D DATA LOGGER  PROTOCOLS  DEFLOY  DOve	ISAGRAF							
> SYSTEM > DATA LOGGER > PROTOCOLS DEFLOY	SUBDEVICES •							
> DATA LOGGER  > PROTOCOLS  DEFLOY  DODE  DODE DODE  DODE  DODE  DODE DODE  DODE  DODE  DODE  DODE  DODE DODE  DODE DODE DODE DODE DODE DODE DODE DODE	> SYSTEM							
> PROTOCOLS         DEFLOY	> DATA LOGGER							
BERLOY	> PROTOCOLS							
	DEPLOY							
Core								
Chose								
								Close
Cancel Update Deployment File Update Deployment And Next							Cancel Update Deployment File	Update Deployment and Next

2. On the Assemblies tab, click the Assemblies checkbox to make the I/O points available for monitoring. The Subdevices configuration is then ready to be deployed.

UNITY EDGE			🔇 Deploy 🕐	Operate 🗏 User	Management		
HCC2 Sales Demo	Deploy > Subdevices						
V DEVICE		5094-IB16XT					
Time & Location	✓ EtherNet/IP Scanner	General Assemblies	Explicit Points Assembly Offset	0-7 Points 8-15 Description	Data Type	Tag Publish	
Network Configuration	5094-IB16XT (5094-IB16XT) :				DINT		
APPLICATION SELECTION		Input		ModuleStatus DiagnosticSequenceC			
ISAGRAF				PtData00			
SUBDEVICES .							
> SYSTEM				PtData02 PtData03	SINT		
> DATA LOGGER							
DEPLOY				PtData05			
		input		PtData06	SINT		
				PtData08			
				PtData09	SINT		
		input		PtData11			
		Input		PtData13	SINT		
		Input		PtData15			

3. Click Update Deployment File (1) and then click Deploy in the navigation tree (2) to open the Deployment wizard.

A contract of the second of	UNITY EDGE			🔇 Deploy	Ø Operate	B User Management				8 ± ± &
<ul> <li>&gt; DEVICE</li> <li>Device information</li> <li>Time &amp; Location</li> <li>Deploy thits</li> <li>Network Configuration</li> <li>APPLICATION SELECTON</li> <li>ISAGAR</li> <li>SUBSERVICES</li> <li>DEFLOY</li> <li>2</li> <li>DEFLOY</li> <li>3</li> <li>DEFLOY<th>Asset Name 🕛 🔇</th><th>Subdevices [AENTR]: Deployment file has been upd</th><th>ated successfully.</th><th>Complete deployment to</th><th>apply the changes to</th><th></th><th></th><th></th><th></th><th></th></li></ul>	Asset Name 🕛 🔇	Subdevices [AENTR]: Deployment file has been upd	ated successfully.	Complete deployment to	apply the changes to					
<ul> <li>ARTR(S04 ADATR)</li> <li>ARTR(S04 ADATR)</li> <li>Biglay Units</li> <li>S04 BETOT (5004 BETOT)</li> <li>S04 BETOT (5004 BETOT (5004 BETOT)</li> <li>S04 BETOT (5004 B</li></ul>	DEVICE     Device Information     Time # Location	✓ EtherNet/IP Scanner	5094-IB10	SXT Assemblies	Explicit Points	0-7 Points 8-15				
New ording rution     New ording rution     APPLICATION SECTION     ISAMAR     SUBDEVICES     > SYSTM     > DRIVCOLS     DPLOV     0 <td>Display Lipite</td> <td>V AENTR (5094-AENTR)</td> <td>1</td> <td>Assembly</td> <td>Assembly Offset</td> <td>Description</td> <td>Data Type</td> <td>Tag Publish</td> <td></td> <td></td>	Display Lipite	V AENTR (5094-AENTR)	1	Assembly	Assembly Offset	Description	Data Type	Tag Publish		
APPLICATION SELECTION       I hund       0       Modelddates       SMT       On Charge Oxyl       -         ISAGRAF       ISAGRAF       IP       IP       Phylication       SMT       On Charge Oxyl       -         SUBDEVICES       IP       IP       IP       Phylication       SMT       On Charge Oxyl       -         SYSTEM       IP       IP       IP       IP       Phylication       SMT       On Charge Oxyl       -         PROTOCOLS       IP       IP </td <td>Network Configuration</td> <td>5094-IB16XT (5094-IB16XT)</td> <td></td> <td></td> <td></td> <td></td> <td>DINT</td> <td>On Change Only</td> <td>-</td> <td></td>	Network Configuration	5094-IB16XT (5094-IB16XT)					DINT	On Change Only	-	
ISACRAF         SUBDEVICES         > SYSTEM         > DATA LOGGER         > PROTOCOLS         DEFLOY         2         1          1	APPLICATION SELECTION			Input		ModuleStatus				
SUBDEVICES         > SYSTEM         > DXTAL LOGGER         > PROTOCOLS         DEFLOY         2         Imput         1         Imput         1         1         1         1         1         1         1         2         1	ISAGRAF			Input		DiagnosticSequenceC	SINI		*	
> SYSTEM > DXTA LODGER > PROTOCOLS DEFLOY 2 10 10 10 10 10 10 10 10 10 10	SUBDEVICES					PtData01				
> DATA LODGER > PROTOCOLS DF/U 2 0 0 0 0 0 0 0 0 0 0 0 0 0	> SYSTEM					PtData02			-	
> PROTOCOLS         DF/UY         2         0	> DATA LOGGER								*	
DPPOY 2 by t 2 by	> PROTOCOLS			Input		PtData04			÷.	
2 Control Control Con	DEPLOY					PtData05			•	
2 Pichado 32 Pichado 36 Pichado SINT Pichado SINT Pic						PtData06			-	
Imput       36       PiDu408       SMT       On Change Only       Imput         Imput       40       PiDu409       SMT       On Change Only       Imput         Imput       44       PiDu408       SMT       On Change Only       Imput         Imput       48       PiDu401       SMT       Imput       Imput         Imput       48       PiDu401       SMT       Imput       Imput         Imput       48       PiDu401       SMT	2					PtData07			·	
Imput       40       PiDulad9       SINT       On: Change Dely       •         Imput       44       PiDula10       SINT       On: Change Dely       •         Imput       48       PiDula11       SINT       On: Change Dely       •         Imput       58       Change Dely <td< td=""><td></td><td></td><td></td><td></td><td></td><td>PtData08</td><td>SINT</td><td></td><td>• .</td><td></td></td<>						PtData08	SINT		• .	
Concel Uddets Dealorment and head						PtData09				
Carbot Uddet Destorment and hed						PtData10				
Cancel Update Deployment and herd				Input	48	PtData11	SINT	On Change Only		
								Cancel	Update Deployment File	Update Deployment and Next

4. Click Start and then click the Deploy button on the right to deploy the subdevice configuration to the HCC2 runtime environment.

UNITY EDGE						🗟 Deploy	Ø Operate	鬼 User Manageme	*	
HCC2 Sales Demo	Deploy > Deploy									
V DEVICE	28-Jan-2024 14:45:01	Success	atus Messa	ge						
Device Information	Application a	valonHcc2App	Core Systems	Data Logger	Event Man	ager I	O Systems	licenseManager	Modbus I	Driver
Time & Location	Status	Juccess	or doccess	9 800055	, or Succes		o doccess	or duccess	0 30000	
Display Units	1 Start				2 Con	nect —				3 Revie
Network Conliguration	Generate Contig	gutation			IP Ad	fress 192	168		41	File na
ISAGRAF	Tag Connection Vali	dations								
SUBDEVICES	Analog Inputs									
✓ SYSTEM	Analog Outputs									
Integrated IO	Digital Inputs									
Communication										
User Alarm Config	Digital Input/Output									
> DATA LOGGER										
PROTOCOCS	Tag Selection	Tag Type	Sek	cted lag		Selected lag ly	pe	Validation		
	Digital Input/Output 1			_customDigital_0: FI1200A_	Reset	Custom		Tag Not Produced		
	Digital Input/Output 2	Produced	Tag I	Not Mapped						
	Digital Input/Output 3			_customISaGRAF_0: resour	ce1.dO3	Produced				
	Digital Input/Output 4	Produced	Tag I	Not Mapped						
	Digital Input/Output 5	Produced	Tag I	Not Mapped						
	Digital Input/Output 6		Tag I	Not Mapped						
	Digital Input/Output 7		Tag I	Not Mapped						

- 5. When the deployment completes, click Operate > Subdevices to view the runtime subdevice data.
- 6. Select the adapter to view the live values in the Assembly Data tab.
- 7. Select the IB16XT module to view the I/O data and status in the Assembly Data tab.

UNITY EDGE		🛠 baptay 🔿 Operate	Å Liter Management	0 L L 8
Asset Name 🕐	(g Spende ) Bubdevices			Device Local Time: 18-Jun 2004 30:10:07
DASHBOARD	Connected Subdexics Instance	Assembly Data Connection Status	Explicit Statistics	
> DEVICE	C ALWER (SOME AUNTR) (INC. MILLSO)	Assembly Hans	Delargen	Water
> INTEGRATED VO	U 1 5094-80587 (5094-80587)	AUNTR : Connection : ConnectionStatus	ev1	
SUBDEVICES		AUNTH : Imput : CHConnections		
LIVE DATA		AUXIII : Input : CIPLantPackets	DINT	tantia
		ADVTR : Input : CPTImenote	DINT	
A COMPANY OF THE OWNER OWNER OF THE OWNER		ADVTR : Ingust : CPUENRoafices	P41	
> AVIALON GATEWAY		AGNTR : Ingut : DURNetworkState	SINT	
) DATA LOGGER		AUNTR : legist : DUBSopervisorRate	SINT	
> LICENSE MANAGER		ADVIII: Input   DisgnorticSequenceCourt	SINT	1000 C
SYSTEM LODS		ADVTR : legist   DiversetErrors	Dent .	
MODEUS		ABNTR : Input : GrandMasterOuckD	LINT	2584092395886298
		AUNTR ; legest ; HMIPscketRate	DINT	
		ADVIE: hquit : 10PecketBale	DINT	
		AUNTR : Input : LocalClaskOffset	UNT	84769408385
		ADITE Input   LocalDockGPbetTimestamp	LINT	1.
		ADVTR : loguet : PortTAutoregatiationDiates	SINT	
		ADNTR   Input   PortTigend		
		ABNTR : Input : Port2AutoregotiationStatus	SINT/	
		ADNTE : Input : Port25pred	<b>1</b>	1 <b>*</b>
		ADITR : Ingest / Station?	SINT	3
		ADVTR : hep-st : Station2	SINT	

#### **Using Data from Subdevices**

Subdevices allow I/O expansion and provide new diagnostics and data tags. Once a subdevices list is deployed, you decide what data to use. Unity Edge lets you view communication statistics and I/O data points. ISaGRAF allows programmers to utilize the I/O data from the subdevices for automation of equipment.

Unity Edge provides the Operate > Subdevices view to visualize the real time diagnostics and I/O data without using any external tools. Simply click on each item in the subdevices list to see the real time data (Assembly Data), and Communication Statistics. The Explicit Statistics tab is not implemented at this time.

#### **Connection Status**

The 5094-AENTR communication adapter has some diagnostics tags that can indicate a connection's status. In the image below, the ConnectionStatus (1) and the GrandMasterClockID (2) indicate the connection status of the device and can be mapped to other applications, or to ISaGRAF variables so a user can make decisions programmatically.

Connected	Subdenica Instance	Assentialy Date Connection Status E	eplicit Statistics			
0	ABATE (DOM-ABATE) (NO.106.1.2)	Assessibly Name	Datatype			
U	1 S064-IBIO(T (5054-IBIO(T)	ABNTR : Connection : ConnectionDatus	847			
		AENTR: Input : CIPConnections	.817			
		ADVTR : Input : CPLostPackets	0447	101024		
		ABNTE : Input : CPTersonals	DINT			
		AINTR : leget : CPUUtilization	BAT .			
		ADVIR: Input: OURNetworkClube	SINT			
		AINTR : Input : DURSuperviserState	SNT			
		ADITE : Input : DiagnosticSequenceCount	SINT			
		ADVTR: logut : lithemattinges	Delta?	1 2		
		AUNTR : Input : GrandMenterClockID	LINT	2586367889944770		
		ADVTR   legar   HMIPschetRate	DWIT			

Other tags in the AENTR Assembly Data will allow you to see DLR status and port speed. Depending on the type of architecture (Linear, Star, DLR) you choose, you may want to use these tags in your logic as well.

Adapter connection statuses are not available for use programmatically, but they can be viewed in Unity Edge for troubleshooting purposes. Connection status is available for every adapter and I/O module supported.

Connected	Subdevice Instance	Assembly Data	Connection Status	Explicit Statistics					
	AENTR (5094-AENTR) [192.168.1.2]		Fwd Opens	Fwd Closes	Fwd Opens Failures	Time Outs	Tx Count	Rx count	Status
	1 5094-IB16XT (5094-IB16XT)						282104	282104	

The IB16XT module Assembly Data tab provides diagnostic and real time I/O data. The ConnectionStatus tag can be used to determine if the module is connected to the adapter and healthy.

#### I/O Data Presentation

Each module differs in the way I/O data is presented. Some use individual tags per point and some combine multiple points in one tag. For example, some 16 point digital input modules may store all 16 inputs in one INTEGER tag. The 5094-IB16XT module used in our example stores each digital input in a separate tag.

Connected	Subdevice Instance	Assembly Data Connection Status Exp	licit Statistics	
C	AENTR (5094-AENTR) [192.168.1.2]	Assembly Name	Datatype	Value
¢	1 5094-IB16XT (5094-IB16XT)	5094-IB16XT : Connection : ConnectionStatus	DINT	
		5094-IB16XT : Input : DiagnosticSequenceCount	SINT	
		5094-IB16XT : Input : ModuleStatus	SINT	17
		5094-IBISXT : Input : PtData00	SINT	
		5094-I816XT : Input : PtData01	SINT	
		5094-I816XT : Input : PtData02	SINT	
		5094-IB16XT : Input : PtData03	SINT	
		5094-1816XT : Input : PtData04	SINT	
		5094-IB16XT : Input : PtDeta05	SINT	
		5094-I816XT : Input : PtDeta06	SINT	
		5094-I816XT : Input : PtDeta07	SINT	
		5094-1816XT : Input : PtData08	SINT	0
		5094-I816XT : Input : PtData09	SINT	
		5094-1816XT : Input : PtDeta10	SINT	
		5094-IB16XT : Input : PtData11	SINT	o
		5094-IB16XT : Input : PtData12	SINT	
		5094-IB16XT : Input : PtData13	SINT	0
		5094-I816XT : Input : PtData14	SINT	
		5094-1816XT : Input : PtData15	SINT	

# Procedure: Map Subdevice I/O and Data to ISaGRAF Variables

With Unity Edge, you can map subdevice I/O and diagnostics data to ISaGRAF variables for use in automation logic using the procedure below.

Add the variables for your automation logic in the ISaGRAF Global tag variables screen. The variables must match the data type of the tag to be mapped, and they must be set to Read attribute, as shown.

Name -	Data	Туре	Dimension	String Size	Initial Value	Direction	Attribute	Retained
· d		· d'	· 01*	· d.	· d*	- 1	· d'	· d*
Tank_01_AL	BOOL	٠				Var 🗸	Read/Write 👻	
Tank_01_AHH	BOOL	2				Var -	Read/Write -	
Tank_01_AH	BOOL					Var -	Write +	
R1S1pt3	INT					Var -	Read -	6
R1S1pt2	INT	•				Var -	Read -	15
R1S1pt1	INT	•				Var -	Read -	

- 1. Download the changes to the ISaGRAF runtime environment.
- 2. In Unity Edge, navigate to the Deploy > ISaGRAF screen. and use the browse button (1) to locate the corresponding tag symbol file.



- 3. In ISaGRAF Workbench, browse to the location of your ISaGRAF project. The tag symbol file will be inside the ISaGRAF project file structure.
- 4. In the example below, the ISaGRAF project is named "Pump\_Tank\_Sim" and a second level directory has the same name. Inside the second level directory is an ISaGRAF symbol file named IDS00101.
- 5. Choose the IDS file based on the number of the resource you have assigned in ISAGRAF as shown. Resource 1 tag data will be in IDS00101, and Resource 2 tag data will be in IDS00201, etc. This will load the tag symbol file.

Organize • New folder			
Pump_Tank_Sim	^ Name	Date modified	Туре
Pump_Tank_Sim	MLGE	10/18/2023 6:12 PM	File folder
MLGE	Pump_Tank_Sim	1/20/2024 4:14 PM	File folder
Pump_Tank_Sim	DS00101	1/20/2024 4:14 PM	File
SMP	DS00201	11/2/2023 1:27 PM	File
webinar_demo	DS00301	11/2/2023 1:28 PM	File

- 6. View the ISaGRAF tags in Unity Edge and enable them to be mapped to I/O data as described below.
  - a. Use the filter box to filter the tags and view just the I/O tags (in this case we are filtering by R1S1).
  - b. Check the box on the left next to each tag name to be mapped.
  - c. Scroll to the right, and make sure the Map To field is set to "Selected Tag". Click on the tag browser button (1) to select the I/O point tag.

Q,	r1s1		×				
		Variable		Map To	Selected Tag Name		
		R151pt2	e	Selected Tag 💌	Not Selected	Circle -	
		R151pt3	Ľ	Selected Tag 💌	Not Selected	Ľ	_
		R1S1pt1	ø	Selected Tag 💌	Not Selected	e	

- 7. In the tag browser window, type the name of the I/O module into the tag name filter to show only the relevant tags from the Subdevice.
- 8. Then double click the I/O tag desired to map it to the ISaGRAF tag.

Application / Tag Group	Tag Type		Data Type
user_modbus_RS485-5_server_aeg	e eneral		ints4 👀 👻
Application / Tag Group	Tag Type	Tag (Dinplay Name)	I Data type
		1. 14	
user_custor/Subdevices	general	5094-1816XT : Connection : ConnectionStatus	1452
user_customSubdevices	general	5094-IBI6XT : Input : ModuleStatus	
user_customSubdevices	general	5094-IBIEXT : Input : OlagnosticSequenceCount	
user_customSubdevices	general	5094-1816XT : Input : PIData00	1-13
user_customSubdevicus	general	5094-IERAXT : Input : PtData01	lets.
user_customSubdevices	general	5094-8598XT : Imput : PtData02	
user_customSubdevices	general	S094-IBIGXT : Input : PtData03	bed.
user_customSubdevices	general	5094-306XT : Input : PtData04	

- 9. Repeat steps 6, 7, and 8 to map all three I/O points in our logic example.
- 10. Click the Update Deployment File button.

0	EGGRAF Deployment file has been updated successfully. Complete deployment	d to apply the change									
	Benness El		Q.m		×						
۲	6660°181				No. In	Selected Say Name	Caston Tag Name		te Patrick	Tay Public	
	Nerve PARP, THAK, SAUDI WOLT/RESOLUCET (D. SHERHINGH) Manifed On 20 Jan 2018 19 18 19 18 19		'n	Ritter	printer -	une contential desires, 0 10% at SAT layor. [2]			100		
				BTDps2					500		
~				RISTARI		www.castandadada.co.0 5394 89507 input. 20			100		
0											
0	S General Sector										
, <b>~</b>											
	Barriera M										
0											
~~·											
								Update Deployment Fil		into Deployment and	-
								and the second se	-		

11. Then click Deploy in the Unity Edge navigation tree to deploy the mapping to runtime.





# Conclusion

Subdevices allow users to expand I/O to fit the needs of a process. The HCC2 utilizes Rockwell Automation FLEX<sup>™</sup> I/O and, FLEX 5000<sup>®</sup> I/O to provide flexible I/O compatible with many different instruments.

When designing an HCC2 control system with subdevices, consider the Ethernet/IP network design guides from Rockwell Automation. If a DLR network is required, include a device that supports Ring Supervisor. The HCC2 has a 32-connection limit, which includes adapters and I/O modules. Some I/O modules (for example, HART AI modules) may consume two connections.

