Industrial Data Center Verification

This chapter, which documents the testing performed on the IDC, includes the following major topics:

- System Verification Coverage
- System Verification Results

The scope of the verification for this CRD is limited compared to the extensive Cisco Validated Design process typically performed by Cisco, Rockwell Automation, and Panduit subject matter authorities. The scope of proof of concept (PoC) testing is more narrowly focused on the IDC itself, and to a limited degree, the directly attached devices. All PoC testing was performed in the full CPwE test lab, which is a comprehensive end-to-end architecture, and the testing documented here should be viewed as an extension to the existing collection of CPwE architectures.

System Verification Coverage

PoC test coverage of the IDC was divided into the four areas described below:

- CPwE IDC EtherNet/IP Connectivity Use Case—Verification of IDC virtualized application server functionality using an HMI Server, Data Server (RSLinx®), FactoryTalk Services Platform, and EtherNet/IP to communicate to the IACS end devices located at Cell/Area Zone (Levels 0-2).

- CPwE IDC ThinManager Operator Workstations Connectivity Use Case—Verification of IDC virtualized operator workstation (OWS) functionality using a PC with RDP client, ThinManager, and a Client installed on an HMI.

- CPwE IDC ThinManager Engineering Workstations Connectivity Use Case—Verification of IDC virtualized engineer workstation (EWS) functionality using a PC at Level 2, Thin Client at Level 2, RDP, PCoIP, and ThinManager.

- CPwE IDC Active Directory Connectivity Use Case—Verification of IDC virtualized Active Directory using Authentication (AAA) for the IACS.

System and Application Setup

Figure 4-1   Testbed Setup
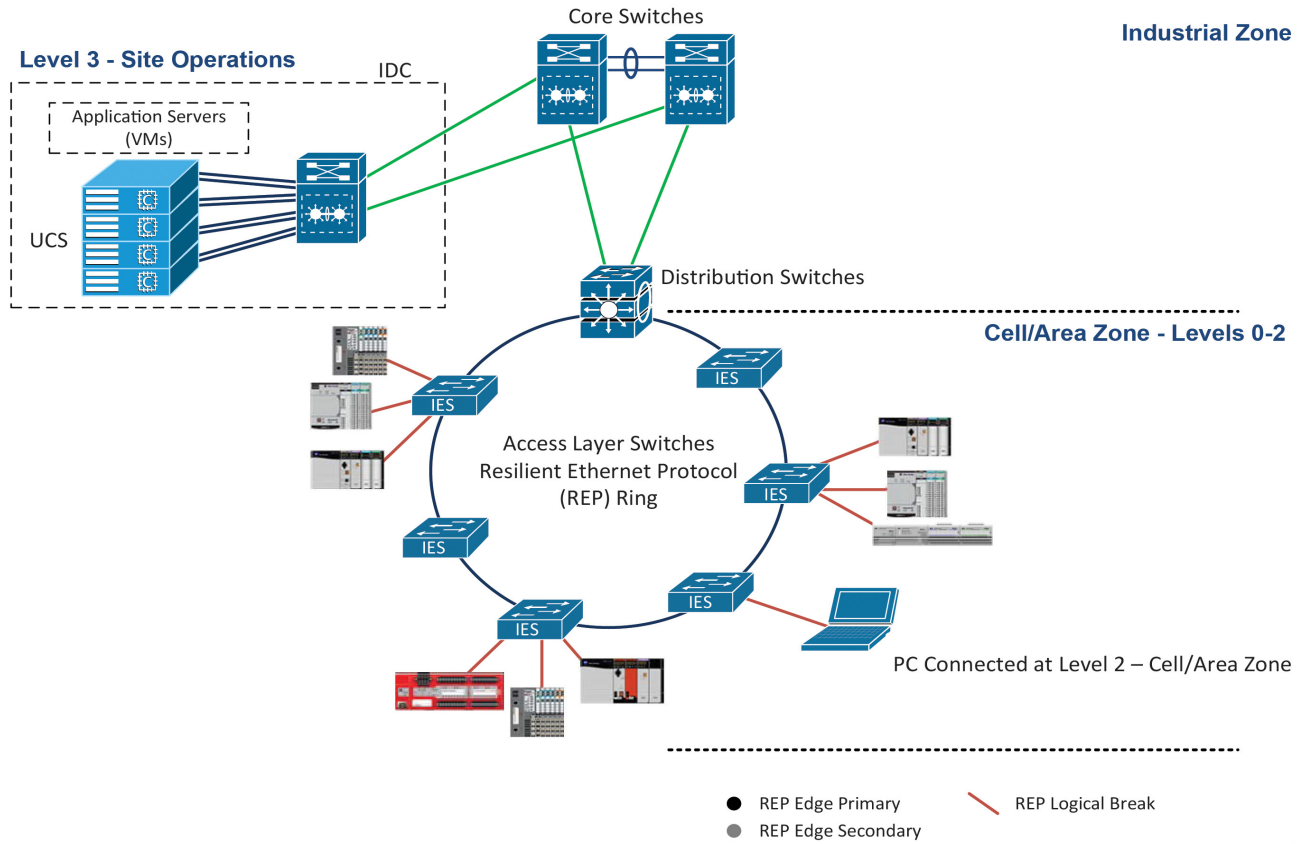
Application/Software	Version
VMware vSphere	6.5 update 1
VMware Horizon View Administrator	7.3.2
VMware View Agent	7.3.2
FactoryTalk Activation Manager	4.00.02
FactoryTalk View Site Edition Server	9.00.00
FactoryTalk View Studio	9.00.00
RSLinx Enterprise	5.90.00
RSLinx Classic	3.74.00
Studio 5000 Logix Designer	20.04/21.00/26.01/27.00/28.00/29.00
ThinManager Server	10.0
ThinManager Client	4.0.0

System Verification Results

Test Case 1—CPwE IDC EtherNet/IP Connectivity Use Case

Use RSLinx data server hosted on a virtual machine (VM) at Level 3 - Site Operations to acquire data from IACS devices at Levels 0-2 - Cell/Area Zone.

Test Setup

Virtual Machine in the IDC—Level 3-Site Operations	
OS Installed	Windows Server 2008 R2
Software	• FactoryTalk View Site Edition Server (RSLinx Enterprise) • RSLinx Classic • FactoryTalk Activation Manager
Configuration	• Network • RSLinx Classic can browse remote subnets • Server: PLN-CPWE-AS1 (Application Server 1)

Verification Procedure

Virtual Machine in the IDC—Level 3-Site Operations			
	Action	Pass/Fail	Comments
1.	Verify RSLinx on server PLN-CPWE-AS1 (Application Server 1) can browse/see devices at Levels 0-2 - Cell/Area Zone.	PASS	See Lab Setup for network configuration.
2.	Verify RSLinx Enterprise PLN-CPWE-AS1 (Application Server 1) can poll data [HMI/SCADA Applications] from devices at Levels 0-2 - Cell/Area Zone.	PASS	

Test Case 2—CPwE IDC ThinManager Operator Workstations Connectivity Use Case

Use PC at Level 2 - Cell/Area Zone to connect to specified OWS applications in the IDC at Level 3 Site Operations.

Test Setup

Part A—Windows RDS Host	
Virtual Machine in the IDC—Level 3-Site Operations	
OS Used	Windows Server 2008 R2
Software	• Windows Remote Desktop Services (Role) • FactoryTalk View Site Edition Client • FactoryTalk Activation Manager
Configuration	A remote user configured so a specified application (HMI) launches when that user connects (via RDP).
Part B—RDP-Windows 7	
Virtual Machine in the IDC—Level 3-Site Operations	
OS Used	Windows 7 Professional
Software	• FactoryTalk View Site Edition Client • FactoryTalk Activation Manager • Desklock
Configuration	Desklock configured to launch applications(s) and prevent the user from accessing the desktop.
Part C—VDI-Windows 7	
Server—Virtual Machine in the IDC—Level 3-Site Operations	
OS Used	Windows 7 Professional
Software	• FactoryTalk View Site Edition Client • FactoryTalk Activation Manager • Desklock
Configuration	Desklock configured to launch applications(s) and prevent the user from accessing the desktop.
Client—PC—Level 2-Cell/Area Zone	
OS Used	Windows 7 Professional
Software	Horizon View Client
Part D—VDI-Application Pool configured in Horizon View Connection Server	
Server—Virtual Machine Server Farm in the IDC—Level 3-Site Operations	
OS Used	Windows Server 2008 R2
Software	• FactoryTalk Site Edition Client • FactoryTalk Activation Manager
Configuration	• Application Pool (Server Farm) is configured in Horizon View Server. • Entitlement for a remote user is added to the Application Pool.
Client—PC—Level 2-Cell/Area Zone	
OS Used	Windows 7 Professional

Software	Horizon View Client
Part E—ThinManager	
ThinManager Server in the IDC—Level 3-Site Operations	
OS Installed	Windows Server 2008 R2
Software	ThinManager Server - ThinManager 10.0
Configuration	Configure Application Link for ThinManager
PC—Level 2-Cell/Area Zone	
OS Installed	Windows 7 Professional
Software	ThinManager Client - WinTMC 4.0.0

Verification Procedure

Part A—Windows RDS Host			
	Action	Pass/Fail	Comments
1.	Use Windows RDP to connect to the remote server.	PASS	
2.	Verify when the user connects, the HMI application is launched.	PASS	
3.	Verify when the user closes the HMI application, the user is disconnected from the server and logged off.	PASS	
Part B—RDP-Windows 7			
	Action	Pass/Fail	Comments
1.	Use Windows RDP to connect to the remote Windows 7 desktop.	PASS	
2.	Verify when the user connects, the only item available is Desklock, and there is no access to the remote Windows 7 desktop.	PASS	Connection passed but had issues with Desklock software: • Not saving/maintaining its configuration. • Desklock software troubleshooting exceeds the scope of this document.
Part C—VDI-Windows 7			
	Action	Pass/Fail	Comments
1.	Use Horizon View Client to connect to the remote Windows 7 desktop.	PASS	
2.	Verify when the user connects, the only item available is Desklock, and there is no access to the remote Windows 7 desktop.	PASS	Connection passed but had issues with Desklock software: • Not saving/maintaining its configuration. • Desklock software troubleshooting exceeds the scope of this document.
Part D—VDI-Application Pool configured in Horizon View Connection Server			

	Action	Pass/Fail	Comments
1.	Use Horizon View Client to connect to the remote Horizon View Server. Application Pool applications are visible and available.	PASS	
2.	Verify when the user can select and open/run the specified application(s) from the Application Pool.	PASS	
Part E—ThinManager			
	Action	Pass/Fail	Comments
1.	Verify the client PC with ThinManager Client (Level 2 - Cell/Area Zone) can connect to the ThinManager Server (Level 3 - Site Operations).	PASS	
2.	Verify the ThinManager client is restricted to the application configured using the Application Link option.	PASS	

Test Case 3—CPwE IDC ThinManager Engineering Workstations Connectivity Use Case

Use PC at Level 2 - Cell/Area Zone to connect to specified EWS applications in the IDC at Level 3 Site Operations.

Test Setup

Part A—Windows RDS Host	
Virtual Machine in the IDC—Level 3-Site Operations	
OS Installed	Windows Server 2008 R2
Software	• Windows Remote Desktop Services (Role) • FactoryTalk View Studio • Studio 5000 Logix Designer • FactoryTalk Activation Manager
Configuration	A remote user configured to have full access to the desktop when that user connects (via RDP).
Part B—RDP-Windows 7	
Virtual Machine in the IDC—Level 3-Site Operations	
OS Installed	Windows 7 Professional
Software	• FactoryTalk View Studio • Studio 5000 Logix Designer • FactoryTalk Activation Manager
Configuration	A remote user configured to have full access to the desktop when that user connects (via RDP).
Part C—VDI-Windows 7	

Virtual Machine in the IDC—Level 3-Site Operations	
OS Installed	Windows 7 Professional
Software	• FactoryTalk View Studio • Studio 5000 Logix Designer • FactoryTalk Activation Manager
Configuration	• Desktop Pool is created/configured in Horizon View Server. • Entitlement for a remote user is added to the Desktop Pool.
PC—Level 2-Cell/Area Zone	
OS Installed	Windows 7 Professional
Software	Horizon View Client
Part D—VDI-Application Pool configured in Horizon View Connection Server	
Virtual Machine Server Farm in the IDC—Level 3-Site Operations	
OS Installed	Windows Server 2008 R2
Software	• FactoryTalk View Studio • Studio 5000 Logix Designer • FactoryTalk Activation Manager
Configuration	• Application Pool [Server Farm] is configured in Horizon View Server. • Entitlement for a remote user is added to the Desktop Pool.
PC—Level 2-Cell/Area Zone	
OS Installed	Windows 7 Professional
Software	Horizon View Client
Part E—ThinManager	
ThinManager Server in the IDC—Level 3-Site Operations	
OS Installed	Windows Server 2008 R2
Software	ThinManager Server - ThinManager 10.0
Configuration	Default settings for ThinManager Server
PC—Level 2-Cell/Area Zone	
OS Installed	Windows 7 Professional
Software	ThinManager Client - WinTMC 4.0.0

Verification Procedure

Part A—Windows RDS Host			
	Action	Pass/Fail	Comments
1.	Use Windows RDP to connect to the remote server.	PASS	

	2.	Verify when the user connects, the user has full access to the remote desktop.	PASS	
Part B—RDP-Windows 7				
		Action	Pass/Fail	Comments
	1.	Use Windows RDP to connect to the remote Windows 7 desktop.	PASS	
	2.	Verify when the user connects, the user has full access to the remote desktop.	PASS	
Part C—VDI-Windows 7				
		Action	Pass/Fail	Comments
	1.	Use Horizon View Client to connect to the remote Windows 7 desktop in the desktop pool.	PASS	
	2.	Verify when the user connects, the user has full access to the remote desktop.	PASS	
Part D—VDI-Application Pool configured in Horizon View Connection Server				
		Action	Pass/Fail	Comments
	1.	Use Horizon View Client to connect to the remote Horizon View Server. Application Pool applications are visible and available.	PASS	
	2.	Verify when the user can select and open/run the specified application(s) from the Application Pool.	PASS	
Part E—ThinManager				
		Action	Pass/Fail	Comments
	1.	Verify the client PC with ThinManager Client (Level 2 - Cell/Area Zone) can connect to the ThinManager Server (Level 3 - Site Operations).	PASS	

Test Case 4—CPwE IDC Active Directory Connectivity Use Case

Configure Active Directory on a server (VM) in the IDC at Level 3—Site Operations.

Test Setup

Active Directory	
OS Installed	Windows Server 2012
Configuration	Active Directory Services (Role)

Verification Procedure

Active Directory		Pass/Fail	Comments
	Action	Pass/Fail	Comments
1.	Verify a user at Level 2 - Cell/Area Zone can authenticate to the Active Directory.	PASS	