Tech Note 879
Redundant Device Integration Object Scan Mode Behaviors

Topic#: 002681
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Introduction

This *Tech Note* outlines how the Application Server Redundant Device Integration Object (RDI) behaves in regard to item subscriptions and activations when the various Device Integration Object (DIObject) Scan Modes are used.

Application Versions

- Wonderware Application Server 2012 Patch 01 (v3.5 p01)

Device Integration Objects

Several DIObjects are delivered with Application Server. DIObjects are used to establish communication to external servers via various protocols for the purpose of retrieving data, generally from PLCs or other field devices. In this document we will focus on the Redundant DIObject (RDI) and DDESuiteLinkClient DIObject (DDESL).

In the DDESL object configuration, you must specify topic name(s) that match existing topic name(s) in the server that you are communicating with. When you configure these topics, there is an option to set the Scan Mode for that topic. The available Scan Modes are ActiveAll, Active, and ActiveOnDemand. The Scan Mode setting changes how item subscription and activation is handled.

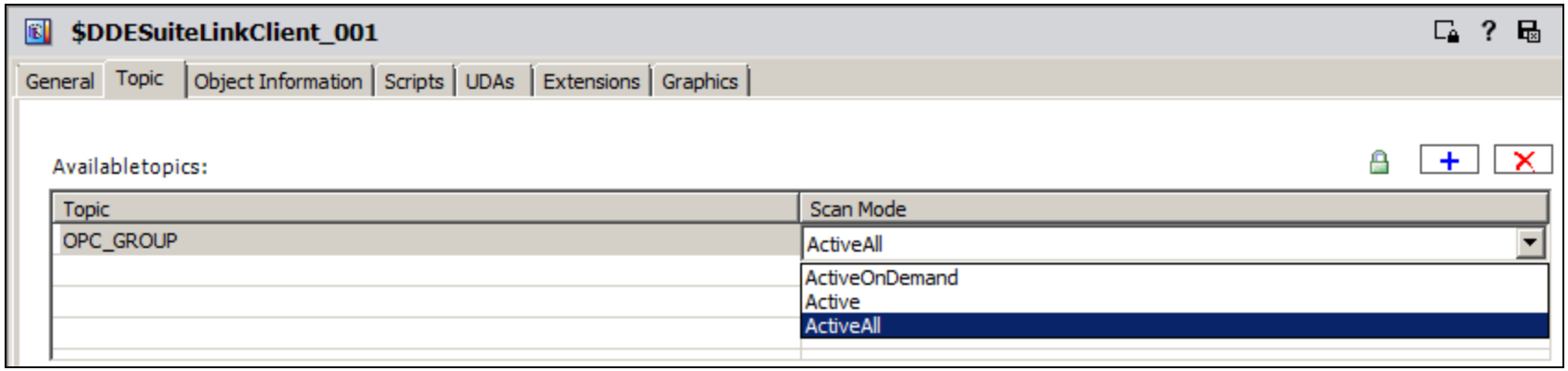


Figure 1: DIObject Scan Modes

Advanced Communications Management

Advanced Communications Management (ACM) is a Galaxy-wide setting that has an additional impact on Scan Mode behaviors.

When ACM is disabled, Scan Modes **ActiveOnDemand** and **Active** behave identically. ACM must be enabled to use ActiveOnDemand features.

Note: **Tech Note 628 Advanced Communication Management for Wonderware Application Server** includes more in-depth information about the ACM feature and the behaviors of the different Scan Modes.

RDI Behavior with Various Scan Modes

Background Information

Understanding the different Scan Modes, along with the pros and cons of each choice, is important. Especially when you are also utilizing the RDI object, since there are items being handled on the active and standby communications paths. The choices you make will impact the load on the PLC, load on the IO servers, failover speed, and application performance.

There are two concepts that must be understood.

- Item Subscription – When a client requests an item from a server, the item is subscribed. The server validates the item syntax and adds the item to the list of items that it needs to monitor in the end device.
- Item Activation - The device is not actually polled and the client is not updated until the item is activated. The ability to deactivate items that are not currently of interest can reduce the amount of system load.

The RDI object utilizes a Ping Item on each topic to help determine source DIObject health. This item is always activated on the active and standby DI source objects to help determine if the objects are actually able to retrieve data, specifically, this helps to ensure the backup DI source is actually functional the event the active source fails and a switch is required. If you do not specify a ping item, the RDI will choose an item from the list of subscribed items to be used as a ping item.

Example Configuration Topology

We will look at the various configuration combinations and discuss the resulting behaviors of the RDI and DIObjects, as well as the pros and cons of the specific configuration. For this example we use a typical customer configuration for redundancy. Figure 2 (below) shows that the system implements server redundancy, but there is only a single end-device.

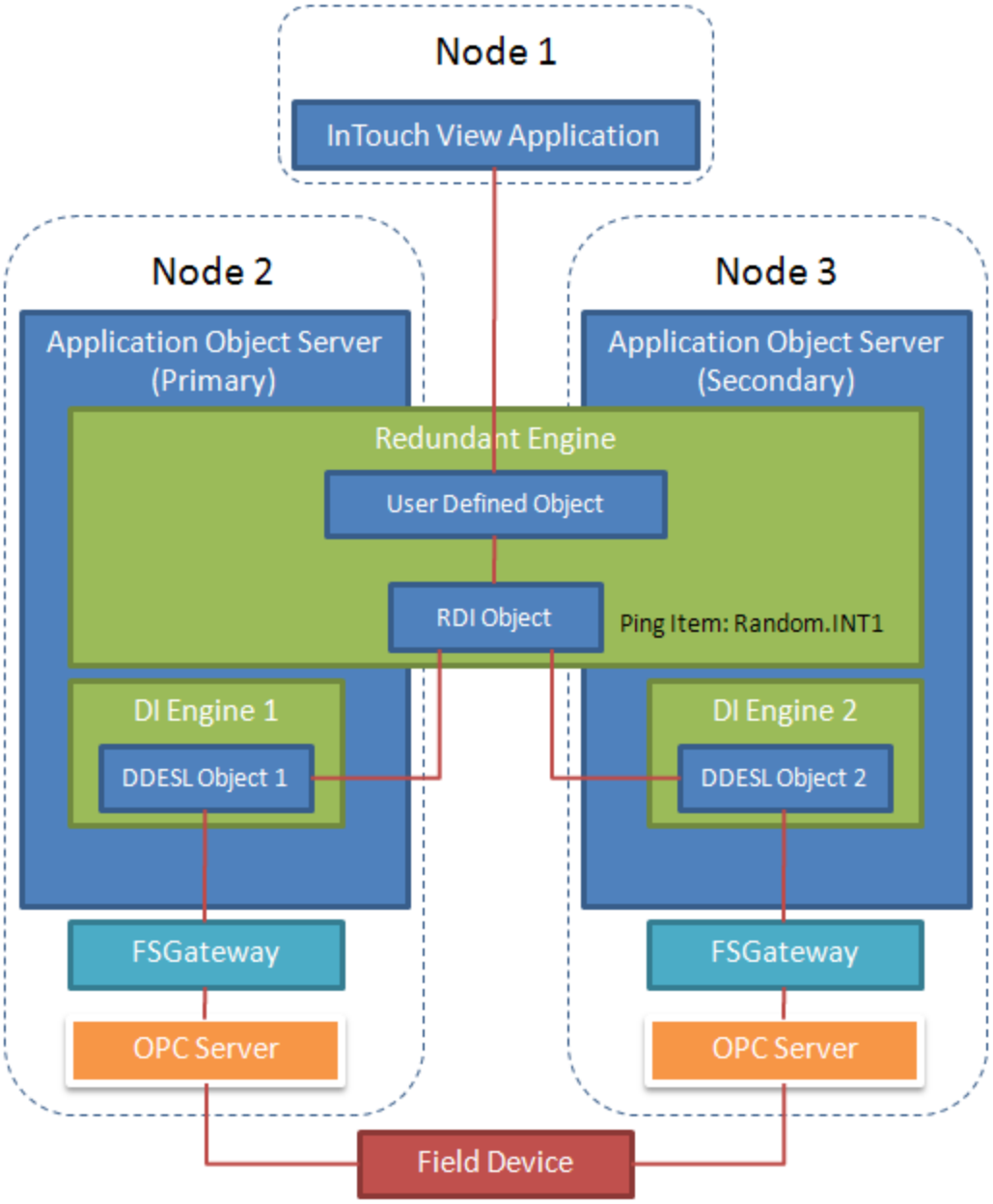


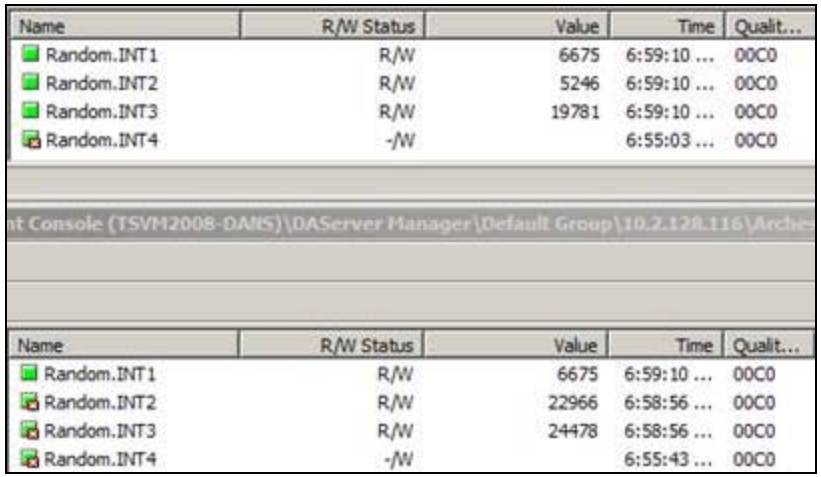
FIGURE 2: EXAMPLE CONFIGURATION TOPOLOGY

In the example, the User Defined Object (UDO) has four Field Attributes defined that are referencing items **Random.INT1**, **Random.INT2**, **Random.INT3**, and **Random.INT4**, respectively. There is no historization or alarming configured.

The diagnostic windows below show the FSGateway diagnostics. Any items shown are subscribed. Items with solid green icons are activated. Items with a green icon and a small red X are deactivated. The top window is the primary path and the bottom window is the backup path.

Scenario A – Default Settings

- Galaxy ACM: **Enabled**
- DDESL object Scan Mode: **ActiveOnDemand**
- Runtime Conditions: InTouch View window open with Random.INT1, INT2, and INT3 showing on the active window.



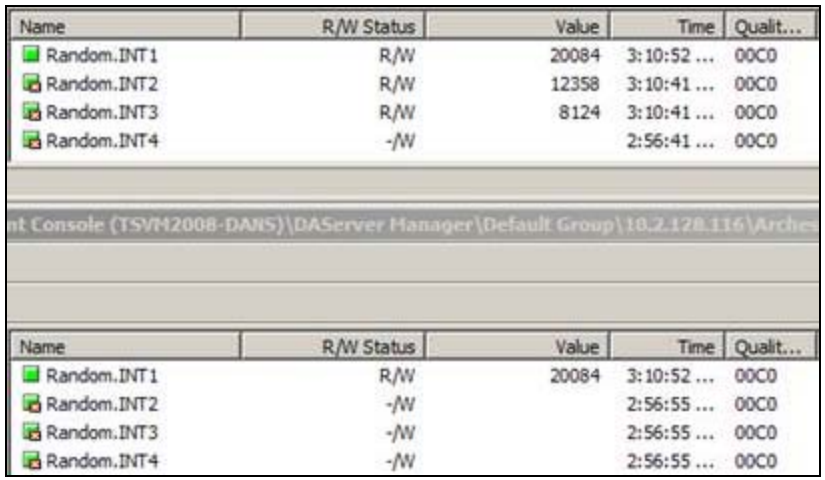
Name	R/W Status	Value	Time	Qualit...
Random.INT1	R/W	6675	6:59:10 ...	00C0
Random.INT2	R/W	5246	6:59:10 ...	00C0
Random.INT3	R/W	19781	6:59:10 ...	00C0
Random.INT4	-/W		6:55:03 ...	00C0

t Console (TSVM2008-DANS)\DAServer Manager\Default Group\10.2.128.116\Arche

Name	R/W Status	Value	Time	Qualit...
Random.INT1	R/W	6675	6:59:10 ...	00C0
Random.INT2	R/W	22966	6:58:56 ...	00C0
Random.INT3	R/W	24478	6:58:56 ...	00C0
Random.INT4	-/W		6:55:43 ...	00C0

Figure 3: Default Settings

- Runtime condition change: InTouch View window closed



Name	R/W Status	Value	Time	Qualit...
Random.INT1	R/W	20084	3:10:52 ...	00C0
Random.INT2	R/W	12358	3:10:41 ...	00C0
Random.INT3	R/W	8124	3:10:41 ...	00C0
Random.INT4	-/W		2:56:41 ...	00C0

t Console (TSVM2008-DANS)\DAServer Manager\Default Group\10.2.128.116\Arche

Name	R/W Status	Value	Time	Qualit...
Random.INT1	R/W	20084	3:10:52 ...	00C0
Random.INT2	-/W		2:56:55 ...	00C0
Random.INT3	-/W		2:56:55 ...	00C0
Random.INT4	-/W		2:56:55 ...	00C0

Figure 4: InTouch View Closed

Observations

The RDI ping item is always active on both servers. All items are subscribed to the primary and backup paths. The items in the View

application are only activated on the active path when the window requires those items. Items are deactivated when the window is closed.

- The field device and FSGateway only have to provide updates to items currently of interest. IO load is reduced in the device and server.
- Failover speed will be somewhat fast, since items are already subscribed on the backup source. The items just need to be activated, which is a much faster action than the subscription process.
- Window switching will be somewhat fast, since items are already subscribed within the active source. The items just need to be activated, which is a much faster action than the subscription process.
- If the User Defined object is undeployed, all items are unsubscribed, except the RDI ping item. When the UDO is redeployed, items will have to be re-subscribed.
  • The requesting object owns the subscription in ActiveOnDemand mode.
- If the RDI is undeployed, the ping item is unsubscribed. No items remain.

Scenario B

- Galaxy ACM: **Enabled**
- DDESL object Scan Mode: **Active**
- Runtime Conditions: InTouch View window open with Random.INT1, INT2, and INT3 showing on the active window.

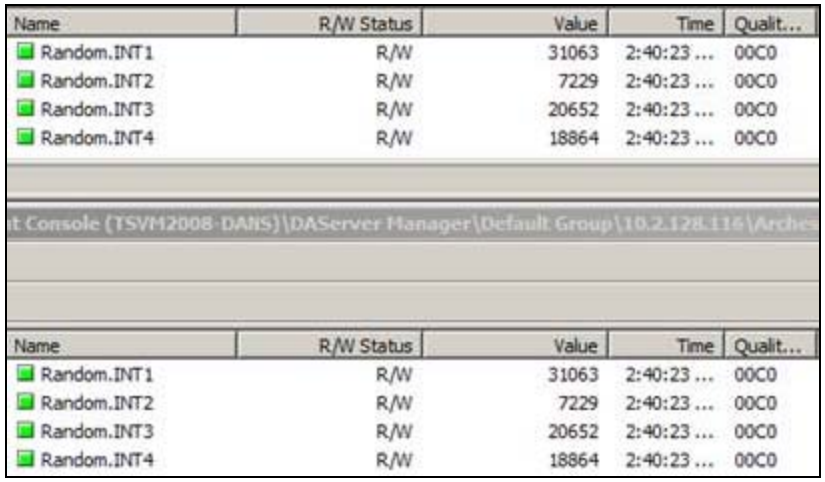


Figure 5: All Items Subscribed and Active on Primary and Backup Paths

Observations

All items are subscribed and active on the primary and backup paths.

- The field device and FSGateway have to provide updates all items. IO load is increased in server and doubled on the device.

- Failover speed will be very fast, since items are already subscribed and active on the backup source.
- Window switching will be very fast, since items are already subscribed and activated within the active source.
- If the InTouch View window or application is closed, there is no change.
- If the User Defined object is undeployed, all items are unsubscribed, except the RDI ping item. When the UDO is redeployed, items will have to be re-subscribed.
  • The requesting object owns the subscription in Active mode.
- If the RDI is undeployed, the ping item is unsubscribed. No items remain.

Scenario C

- Galaxy ACM: **Enabled**
- DDESL object Scan Mode: **ActiveAll**
- Runtime Conditions: InTouch View window open with Random.INT1, INT2, and INT3 showing on the active window.

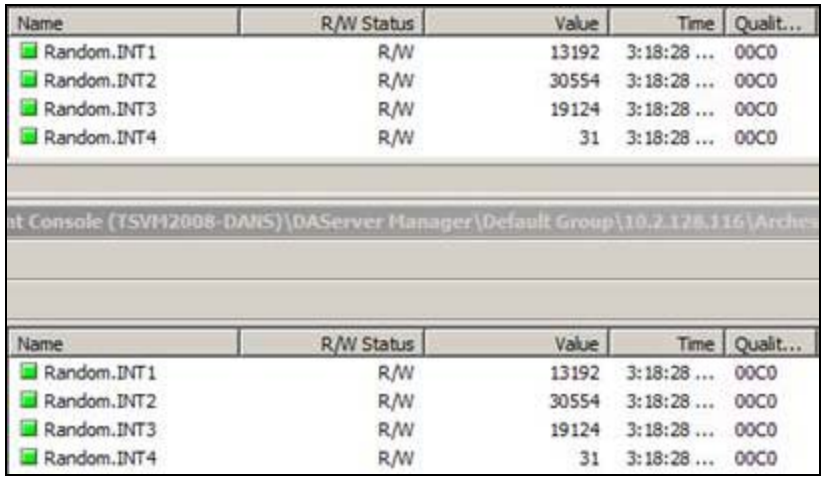


Figure 6: All Items Subscribed and Active on Primary and Backup Paths

Observations

All items are subscribed and active on the primary and backup paths.

- The field device and FSGateway have to provide updates all items. IO load is increased in server and doubled on the device.
- Failover speed will be very fast, since items are already subscribed and active on the backup source.
- Window switching will be very fast, since items are already subscribed and activated within the active source.
- If the InTouch View window or application is closed, there is no change.

If the User Defined object is undeployed, there is no change. When the UDO is redeployed, item subscriptions will be reused. Deployment will be faster than the other modes.
• The DDESL object owns the subscription in ActiveAll mode

- If the **RDI** is undeployed, there is no change.
- If the **DDESL** objects are undeployed, all items are unsubscribed.

Scenario D

- Galaxy ACM: **Disabled**
- DDESL object Scan Mode: **Active**
- Runtime Conditions: InTouch View window open with Random.INT1, INT2, and INT3 showing on the active window

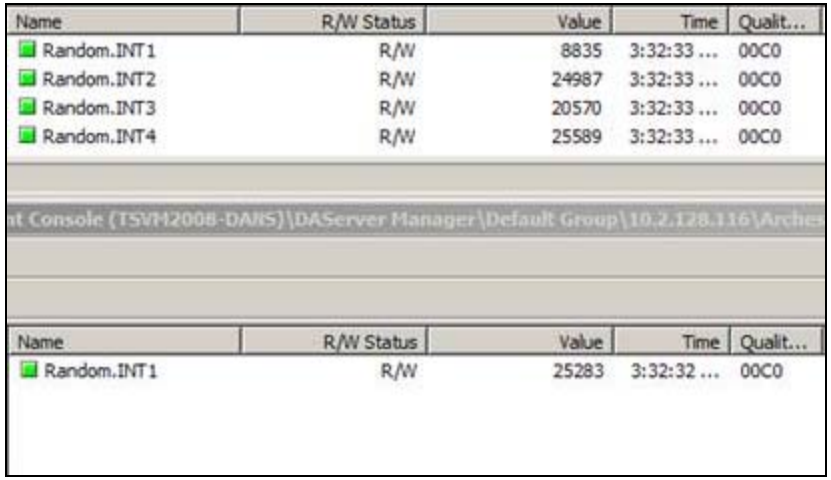


Figure 7: All Items Subscribed and Active on Primary Path / Ping Item Only on Backup Path

Observations

All items are subscribed and active on the primary path. Only the ping item is subscribed and active on the backup path.

- The field device and FSGateway have to provide updates for all items on the primary path and only the ping item on the backup path. IO load is decreased in the device and server from the backup path, but overall the load is not reduced as greatly as when ACM is enabled, since all deployed object attributes will be polled. In this example, that is only one item, 'Random.INT4', but in a real application there would be many items polled that are not on the current window.
- Failover speed will be slow, since items are not yet subscribed on the backup source.
- Window switching will be very fast, since items are already subscribed and activated within the active source.
- If the InTouch View window or application is closed, there is no change.
- If the User Defined object is undeployed, all items are unsubscribed, except the RDI ping item. When the UDO is redeployed, items

will have to be re-subscribed.
• The requesting object owns the subscription in Active mode

- If the RDI is undeployed, the ping item is unsubscribed. No items remain.

Scenario E

- Galaxy ACM: **Disabled**
- DDESL object Scan Mode: **ActiveAll**
- Runtime Conditions: InTouch View window open with Random.INT1, INT2, and INT3 showing on the active window

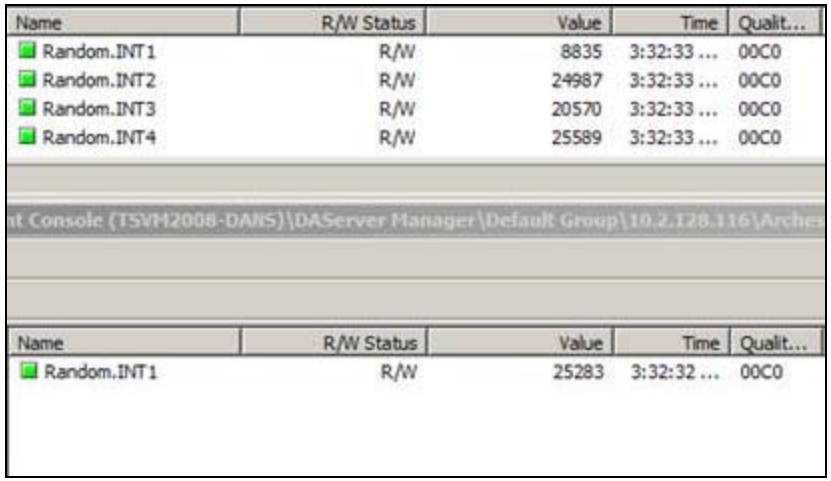


Figure 8: Before Failover, Only Ping Subscribed and Active on Backup Path

After the first failover:

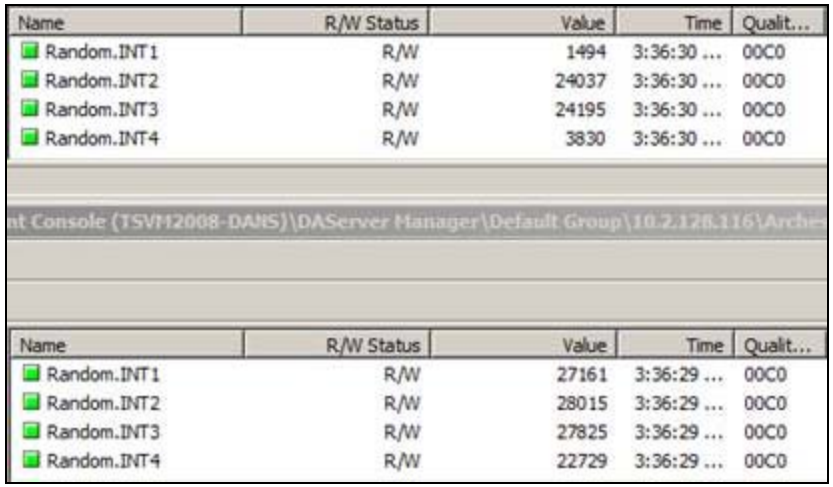


Figure 9: After Failover All Items Subscribed and Active on Both Paths

Observations

Initially all items are subscribed and active on the primary path. Only the ping item is subscribed and active on the backup path, but after the first failover, all items are subscribed and activated on both paths.

- Initially, the field device and FSGateway have to provide updates for all items on the primary path and only the ping item on the backup path. IO load is decreased in the device and server from the backup path, but overall the load is not reduced as greatly as when ACM is enabled, since all deployed object attributes will be polled. In this example, that is only one item, 'Random.INT4', but in a real application there would be many items polled that are not on the current window.
- After a failover, the field device and FSGateway have to provide updates all items. IO load is increased in server and doubled on the device.
- The first failover will be slow, since items are not yet subscribed on the backup source. Subsequent failovers will be fast since all items are subscribed and activated.
- Window switching will be very fast, since items are already subscribed and activated within the active source.
- If the InTouch View window or application is closed, there is no change.
- If the User Defined object is undeployed, there is no change. When the UDO is redeployed, item subscriptions will be reused. Deployment will be faster than the other modes.
  • The DDESL object owns the subscription in ActiveAll mode
- If the RDI is undeployed, there is no change. If the DDESL objects are not redeployed, the first failover will be fast since the items are still subscribed and activated on those objects.
- If the DDESL objects are undeployed, all items are unsubscribed.

D. Scott

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