LINKING LOGIC

GLOBAL CODE AND COMPONENT LINKING

Controllers can perform Local (within a controller) as well as Global (throughout a Location) I/O linking.
A vast number of operations can be performed by I/O Linking without the use of PLCs, timers, and external relays.
This powerful linking logic provides DSX the ability to fulfill applications such as Man - Traps, Do Not Unlock Door Until First Card Read, and other assorted interlocking functions.

Inputs can link to other inputs, outputs and/or to Time Zones.
      Inputs exist in 3 states: Normal, Abnormal (non-alarm) and Alarm.
      Changes to the Input State can initiate a linking event.
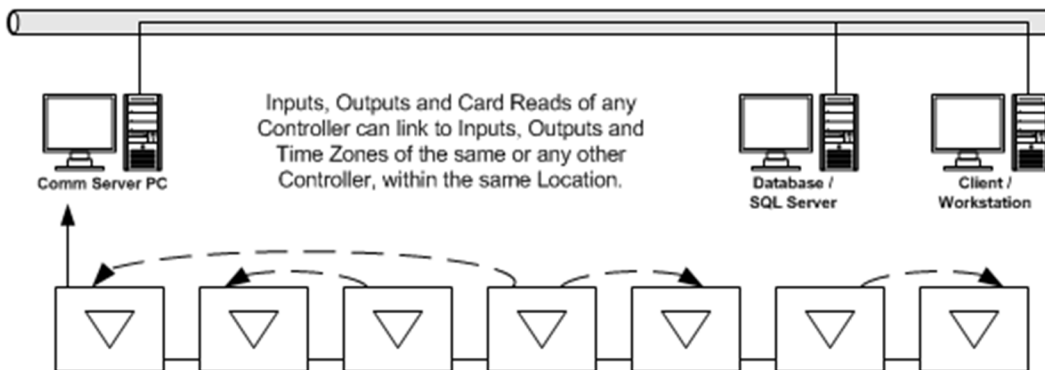**Outputs** can link to other outputs, inputs and/or to Time Zones.
      Outputs exist in 2 states: Energized and De-Energized.
      Changes to the Output State can initiate a linking event.
Codes can link to inputs, outputs, and/or Time Zones.

LINKING REACTIONS

- Linking to an Input allows for control of its armed state.
- Linking to an Output allows for control of its on/off state.
- Linking to a Time Zone forces it to be active (On) or inactive (Off). The On or Off state of a Time Zone applies to everything controlled by the Time Zone.

Inputs, Outputs and Card Reads of any Controller can link to Inputs, Outputs and Time Zones of the same or any other Controller, within the same Location.

Comm Server PC

Database / SQL Server

Client / Workstation

LINKING RESPONSES

Pulse is a link for a pre-determined amount of time.
Follow is a link that mirrors the state of an Input or an Output that initiated it.
Latch is a link that is indefinite until a Time Zone command or link is received.
Time Zone is a link that sets the Input, Output or Time Zone that is being linked, to its pre-programmed schedule/state. **Toggle** is a link that causes the armed state or the on/off state to change to the opposite position each time the toggle link is received.

Linking Groups

Linking Groups can be defined as a list of components to be activated.
Linking Groups can contain a single Input, Output or Time Zone OR multiple Inputs, Outputs and Time Zones.
Each component (Input, Output and/or Time Zone) in the group has its own response to the link.
Grouping links makes it possible to link to multiple components with each point responding differently.

Inputs, Outputs and Codes initiate or activate Linking Groups.
Linking Groups can be triggered by inputs changing state from normal to abnormal or going into alarm.
Linking Groups can also be triggered by Outputs going from either open to secure or from secure to open.
Linking Groups can also be activated by a card read or keypad entry with the use of a Linking Level.

Linking Levels

Assigned to access codes, Linking Levels determine which Linking Group will be activated when an access code is used at a card reader/keypad device that has been defined for Code to Linking Logic.
The same Linking Level can activate different Linking Groups depending on the reader or keypad used.

Linking Levels define the relationship between an access code, the reading device, and a Linking Group.
Components are Inputs, Outputs, and Time Zones.
Linking to an Output controls its On/Off State.
Linking to an Input controls its Armed State.
Linking to a Time Zone controls its state of Active(On) or Inactive(Off).

Applications of Linking Levels:

Elevator and HVAC Control - Many relay outputs can be activated from a single card read. Different relay outputs can be activated depending on the specific Reader and Card Linking Level.
Threat Level Management - Linking can arm inputs and secure outputs in response to a threat.

Component Linking

Component Linking provides the ability to link to Time Zones as well as Inputs and Outputs.
Most things (Components) in the system that are controlled by a Time Zone can be controlled through Linking.
Time Zones can be forced into an On or Off State thereby controlling everything controlled by that Time Zone.
Time Zones can control Access Levels, Devices (readers/keypads), Inputs, Outputs, and Linking Groups.
- Time Zones can be turned on or off instantly without altering the database or downloading data.
- Time Zones can be controlled with / by:
  - Card Read (Code to Time Zone Link)
  - Change of state of Input or Output (I/O to Time Zone Link)
  - Manually from the workstation program with the use of a Virtual Output (Output that does not physically exist).

Only links completed by Workstation Operator Control or a Scheduled Override require the Comm Server to be online. All others linking occurs at the Control Panel Level.

Virtual Outputs

Virtual Outputs do not physically exist on a Controller.
They can be programmed into the system and used in a variety of access control applications.
Virtual Outputs can be Controlled by:

Manually from the Output Control Window of Workstation by the Operator
By Time Zones or by Scheduled Overrides
By Linking

System Requirements for Component Linking

Software Version: WinDSX 3.7 and higher or WinDSX SQL 4.7 and higher.
To Link to a Time Zone
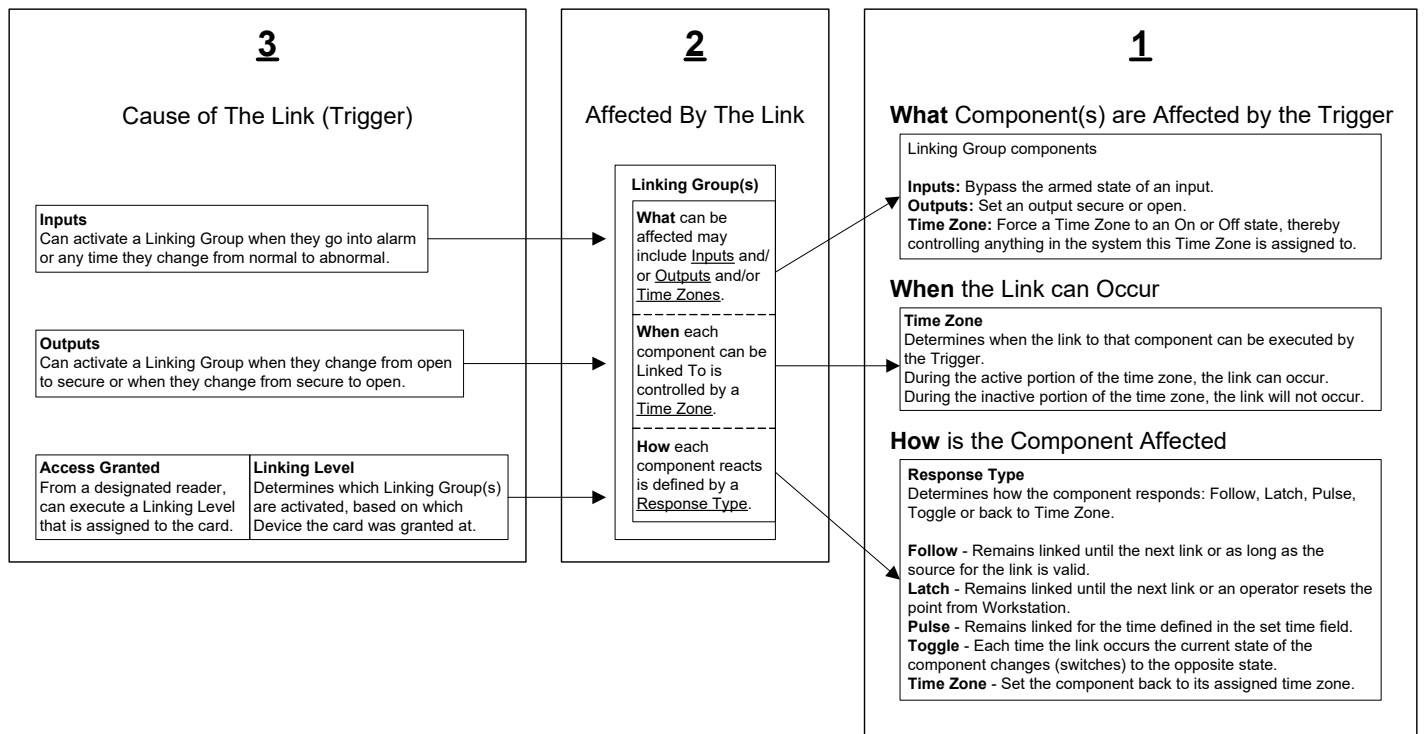   All Controllers must be 1040 Series, 1022, or 1030PR5
      Firmware Version 3129 and higher.

Linking Characteristics

The following applies to linking both inputs and outputs

Link Response	Overridden by: Follow	Latch	Pulse	Toggle	Time Zone
Follow	X	X		X	X
Latch				X	X
Pulse	X	X	X	X	X
Toggle		X		X	X
Time Zone	X	X	X	X	NA

Flow Chart of DSX Linking Logic

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Cause of The Link (Trigger)

Inputs
Can activate a Linking Group when they go into alarm or any time they change from normal to abnormal.

Outputs
Can activate a Linking Group when they change from open to secure or when they change from secure to open.

Access Granted
From a designated reader, can execute a Linking Level that is assigned to the card.

Linking Level
Determines which Linking Group(s) are activated, based on which Device the card was granted at.

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Affected By The Link

Linking Group(s)

What can be affected may include <u>Inputs</u> and/or <u>Outputs</u> and/or <u>Time Zones</u>.

When each component can be Linked To is controlled by a <u>Time Zone</u>.

How each component reacts is defined by a <u>Response Type</u>.

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What Component(s) are Affected by the Trigger

Linking Group components

Inputs: Bypass the armed state of an input.
Outputs: Set an output secure or open.
Time Zone: Force a Time Zone to an On or Off state, thereby controlling anything in the system this Time Zone is assigned to.

When the Link can Occur

Time Zone
Determines when the link to that component can be executed by the Trigger.
During the active portion of the time zone, the link can occur.
During the inactive portion of the time zone, the link will not occur.

How is the Component Affected

Response Type
Determines how the component responds: Follow, Latch, Pulse, Toggle or back to Time Zone.

Follow - Remains linked until the next link or as long as the source for the link is valid.
Latch - Remains linked until the next link or an operator resets the point from Workstation.
Pulse - Remains linked for the time defined in the set time field.
Toggle - Each time the link occurs the current state of the component changes (switches) to the opposite state.
Time Zone - Set the component back to its assigned time zone.

Input to Input Linking

1. Enable Linking Logic under Location/Yes-No Options.
2. Add the input(s) that you want to link from and the input(s) to link to.
3. Add a Linking Group consisting of the input(s) to be linked to.
4. Assign the Linking Group to the input(s) that initiates the link.

Important Input Linking Notes

- By linking to an input, the armed state of the input can be bypassed.
- The input must be initially armed by Time Zone so the input link can change its armed state.
- If the input that is linked to is armed when the link occurs, the input will be bypassed.
- If the input is not armed by Time Zone when the link occurs nothing takes place.
- When the link to an input expires, the input returns to its Time Zone.

Input to Input Linking Responses

- **Latch** = The input is bypassed until reset from the WinDSX Workstation or from another link that is programmed with a response of Time Zone to put it back to its time zone schedule.
- **Pulse** = The input is bypassed for the amount of time that is set using Pulse Time. "Pulse Time" can be from 1 to 32767 seconds or 1 to 546 minutes.
- **Follow** = The input armed state follows the normal/abnormal state of the point that initiates the link.
- **Toggle** = Changes the input to the opposite of its current armed state.
- **Time Zone** = Return the input to its programmed Time Zone.

Input to Output Linking

1. Enable Linking Logic under Location/Yes-No Options.
2. Add the Input(s) that you want to link from and the Output(s) you want to link to.
3. Add a Linking Group consisting of the Output(s) to be linked to.
4. Assign the Linking Group to the Input(s) that initiates the link.

Important Output Linking Notes

- Add the "Input(s)" to link from and the "Output(s)" to be linked to.
- On the Input "General" tab, select a "Time Zone" which defines when the Input is armed.
- In the Output/Options Tab select the "State When Linked To". This will be the state that the output should go to when it is linked to. It is suggested that the on or energized state of the output that is being linked to impede the operation of the other system it is controlling. This ensures that in the event of a failure, the other system returns to normal operation.
- The "Time Zone" is the state in which the output should be normally.
- The "State When Linked To" is the state that the output should change to when the link occurs.
- This only applies to the output that is receiving the link, not the input that is initiating the link.

Output Linking Responses

- **Latch** = The output is opened or secured, according to its configuration, until reset from the WinDSX Workstation or from another link that is programmed with a response of Time Zone to put it back to its schedule.
- **Pulse** = The output is opened or secured, according to its configuration, for the amount of time that is set using Pulse Time. "Pulse Time" can be from 1 to 32767 seconds or 1 to 546 minutes.
- **Follow** = The output follows the open or secure state, according to its configuration, of the initiating point.
- **Toggle** = Change the output to the opposite of its current state.
- **Time Zone** = Return the output to its programmed Time Zone Schedule.

OUTPUT TO INPUT LINKING

1. Enable Linking Logic under Location/Yes-No Options.
2. Add the Output(s) that you want to link from and the Input(s) you want to link to.
3. Add a Linking Group consisting of the Input(s) to be linked to.
4. Assign the Linking Group to the Output(s) that initiates the link.

Important Input Linking Notes

- By linking to an input, the armed state of the input can be bypassed.
- The input must be initially armed by time zone so the input link can change its armed state.
- If the input is not armed by time zone when the link occurs nothing takes place.
- When the link to an input expires, the input returns to its time zone.

Linking Responses

- **Latch** = The input is bypassed until reset from the WinDSX Workstation.
- **Pulse** = (the input is bypassed for an amount of time that is set using Pulse Time. "Pulse Time" can be from 1 to 32767 seconds or 1 to 546 minutes)
- **Follow** = The input armed state follows the normal/abnormal state of the point that initiates the link.
- **Toggle** = Change the input to the opposite of its current armed state.
- **Time Zone** = Return the input to its programmed Time Zone.

CODE TO INPUT LINKING

1. Enable Code to Linking Logic under Location/Yes-No Options.
2. Enable Device Used for Code to Linking Logic under Device/Options - on all devices to initiate the link.
3. Add the Input(s) to be linked to (inputs must have time zone assigned to be armed).
4. Add a Linking Group consisting of the Input(s) to be linked to.
5. Add a Linking Level.
6. Assign the Linking Level to the code(s)(cards) that should initiate the link. Codes (cards) must have an Access Level before they can be assigned a Linking Level.

Important Input Linking Notes

- Add the "Input (s)" to be linked to.
- By linking to an input, the armed state of the input can be bypassed.
- The input must be initially armed by time zone so the input link can change its armed state.
- When the link to an input expires, the input returns to its time zone.

Linking Responses

- **Latch** = The input is bypassed until reset from the WinDSX Workstation or until it receives a Link with a response of Time Zone.
- **Pulse** = The input is bypassed for the amount of time that is set using Pulse Time. "Pulse Time" is 1-32767 seconds or 1-546 minutes.
- **Toggle** = Change the input to the opposite of its current armed state.
- **Time Zone** = Return the input to its programmed Time Zone.

OUTPUT TO OUTPUT LINKING

1. Enable Linking Logic under Location/Yes-No Options.
2. Add the Output(s) that you want to link from and the Output(s) to link to.
3. Add a Linking Group consisting of the Output(s) to be linked to.
4. Assign the Linking Group to the Output that initiates the link.

Important Output Linking Notes

- The "Time Zone" is the state in which the output should be normally.
- The "State When Linked To" is the state that the output should change to when the link occurs. It is suggested that the on or energized state of the output that is being linked to impede the operation of the other system it is controlling. This ensures that in the event of a failure, the other system returns to normal operation.
- This only applies to the output that is receiving the link, not the output initiating the link.

Linking Responses

- **Latch** = The output is opened or secured, according to its configuration, until reset from the WinDSX Workstation or until reset from another link that is programmed with a response of Time Zone to put it back to its schedule.
- **Pulse** = The output is opened or secured, according to its configuration, for the amount of time that is set using Pulse Time. "Pulse Time" can be from 1 to 32767 seconds or 1 to 546 minutes.
- **Follow** = The output follows the open or secure state, according to its configuration, of the point that initiates the link.
- **Toggle** = Change the output to the opposite of its current state.
- **Time Zone** = Return the output to its programmed Time Zone Schedule.

CODE TO OUTPUT LINKING

1. Enable Code to Linking Logic under Location/Yes-No Options.
2. Enable Device Used for Code to Linking Logic under Device/Options on all Devices that should initiate the Link.
3. Add the output(s) to be linked to.
4. Add a Linking Group consisting of the output(s) to be linked to.
5. Add a Linking Level.
6. Assign the Linking Level to the code(s) (cards) that should initiate the link. Codes (cards) must have an Access Level before they can be assigned a Linking Level.

Important Output Linking Notes

- The "Time Zone" is the state in which the output should be normally.
- In the Output/Options Tab select the "State When Linked To". This is the state that the output should go to when the link occurs. It is suggested that the on or energized state of the output that is being linked to impede the operation of the other system it is controlling. This ensures that in the event of a failure, the other system returns to normal operation.
- The "State When Linked To" is the state that the output should change to when the link occurs.
- This only applies to the output that is receiving the link, not the output that is initiating the link.
- **For Elevator Control** it is recommended that each output be placed in a Linking Group by itself.

Linking Responses

- **Latch** = The output is opened or secured, according to its configuration, until reset from the WinDSX Workstation or until reset from another link that is programmed with a response of Time Zone to put it back to its schedule.
- **Pulse** = The output is opened or secured, according to its configuration, for the amount of time that is set using Pulse Time. "Pulse Time" can be from 1 to 32767 seconds or 1 to 546 minutes.
- **Toggle** = Change the output to the opposite of its current state.
- **Time Zone** = Return the output to its programmed Time Zone.

TIME ZONE LINKING

1. Enable Device Used for Code to Linking Logic under Device/Options. (for code activated linking only) on all readers involved.
2. Add the time zone(s) to be linked to. Set the Time Zones to be On or Off when linked to.
3. Add a Linking Group consisting of the time zone(s) to be linked to.
4. Assign the Linking Group to the Inputs and/or Outputs that should initiate the link.
5. For Code initiated linking, Add a Linking Level and Assign the Linking Level to the code(s) that should initiate the link.

Important Time Zone Linking Notes

- Add the "Time Zone (s)" to be linked to.
- On the "Time Zone" > "General " tab select the "Time Zone is On or Off" when Linked to.
- This is the state that the Time Zone should go to when the link occurs.
- Select On if you want the Time Zone to become active when linked to.
- Select Off if you want the Time Zone to become inactive when linked to.
- Linking to a Time Zone can force it to a pre-selected state of on or off as chosen here.
- Anything this Time Zone is assigned to is subsequently affected.
- This could be used to control Access Levels, Devices (readers/keypads), Inputs, Outputs, and Linking Groups.
- The Time Zones that are being linked to cannot be assigned to what is initiating the link. In other words – What links to the Time Zone cannot be controlled by the Time Zone.
- Build as many Time Zones as necessary to make sure that when you link to a Time Zone it only affects those things you want affected. Re-using Time Zones could cause something to be controlled from a Link that was not desired.
- If you link to a Time Zone with a Latch response you must have another Linking Group that links to that same Time Zone with a response of Time Zone.

Linking Responses

- **Latch** = The time zone is turned On or Off, according to its configuration, until reset from another link that is programmed with a response of Time Zone to put it back to its schedule.
- **Pulse** = The time zone is turned On or Off, according to its configuration, for the amount of time that is set using Pulse Time. "Pulse Time" from 1 to 32767 seconds or 1 to 546 minutes.
- **Follow** = The time zone on or off state is following the status of the input or output that initiates the link.
- **Toggle** = The time zone is turned to its opposite state, if it was active it becomes inactive and vice versa.
- **Time Zone** = Return the time zone to its programmed Schedule.