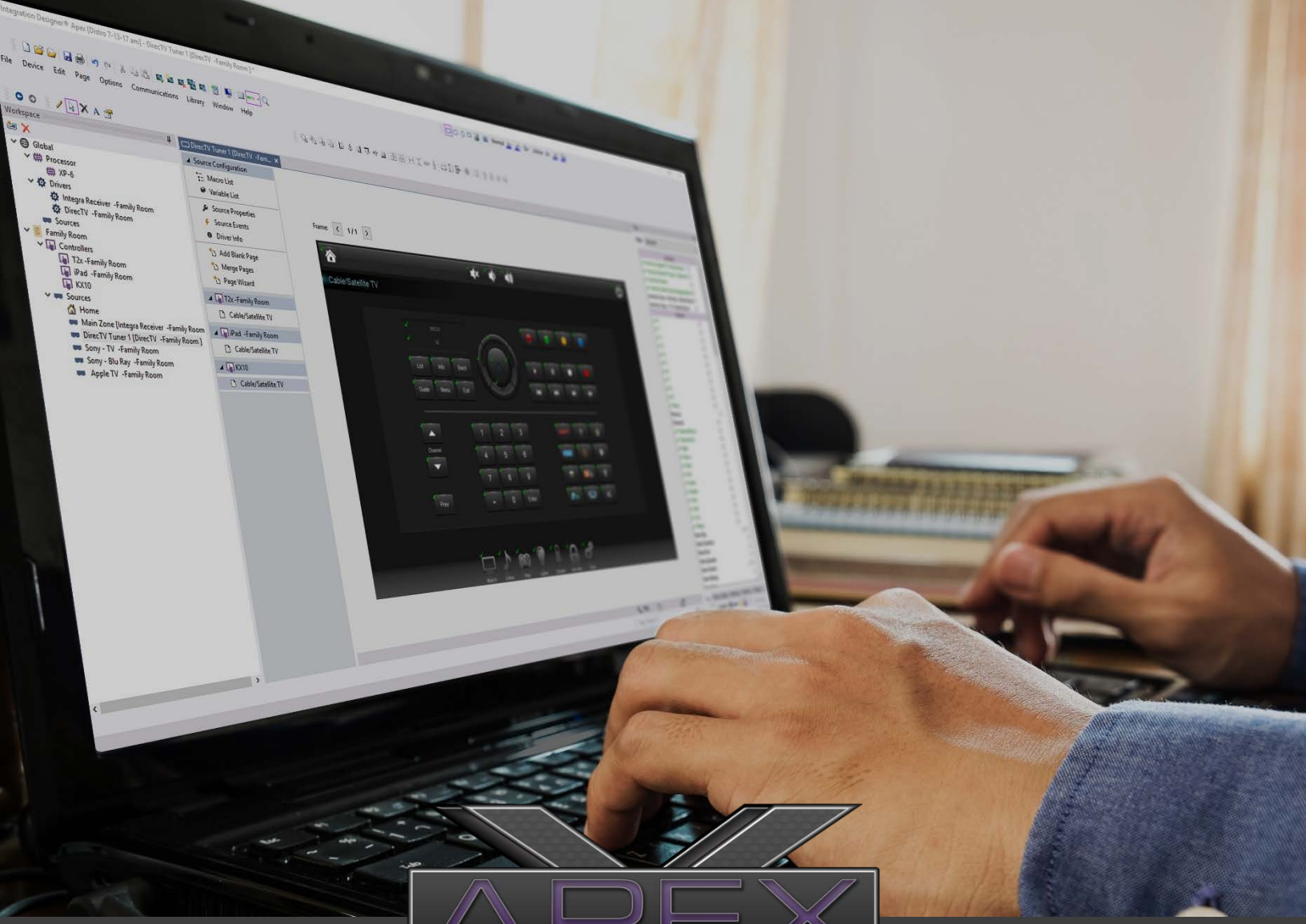


INTEGRATION DESIGNER® APEX

System Design and Custom Programming Workbook

INTEGRATION DESIGNER® APEX OVERVIEW

Integration Designer APEX offers a brand-new approach to automation control software, giving you the efficiency you need to scale your business, with complete freedom to customize experiences and keep your competitive edge. APEX combines the best of both programming worlds, bringing time-saving workflows into a platform that's entirely "open" or customizable.

The new auto-programming features in APEX give you an enormous head start on every project, reducing programming steps and giving you more agility to scale quickly and focus on the experiences your client will value. Standard buttons that used to take hours to program can now be done in minutes. With efficiency, speed, and total control, you're now better equipped to compete in new markets and run a more profitable business.

During this interactive course, we will explore basic programming concepts and discuss real-world scenarios to guide you through the process from setup to completion. The course will be hands-on, where you will be challenged to you create a system and discuss it with the instructor.

PROGRAMMING INTRODUCTION

Integration Designer APEX introduces a new way of connecting the user interface programming to the control logic. Instead of assigning macros and commands directly to buttons, each button in the UI has a "tag" that allows it to connect with the appropriate programming. This clean separation of UI and logic allows several new capabilities:

- The new auto-programming capabilities can generate the control programming while being compatible with any appropriately-tagged UI template
- The programming can be defined at multiple levels so that programming can be defined once and shared among as many devices as necessary
- The programming can be switched out to a different device without changing the UI

To resolve the programming on any given button, the tags are searched in the following order for a match (highest priority to lowest): Controller: Room: Source: Global. Most of the programming will take place at the "Source" level (e.g. the Blu-Ray player). All controllers that have access to that source will automatically share the programming. You can then program commands like "Volume Up" at the Room level, and all controllers in that room will automatically share that programming, so that you can modify it in a single place if it changes.

KEY CONCEPTS AND TERMS

Tags are a new and powerful time saving feature that will allow you to share Macros or Variables across multiple pages, and even across multiple devices. In Integration Designer APEX, every button or active text box will need to have a Tag assigned to it. Each Tag will need to be assigned to a Macro or a Variable. Tags can be shared between pages and devices.

EXAMPLE

T1-B+	T2X	KX-7
		
		

In this example, we have a T1-B+, a T2X, and a KX-7. The Channel Up buttons have been assigned the Tag of Channel Up. This Channel Up Tag will need to have a Macro assigned to it.

Xfinity X1 Cable Box


In this case, the Channel Up command for a Xfinity X1 cable box is in the Macro that is assigned to the Channel Up Tag.

DirecTV Genie Cable Box


The customer has recently decided to change their cable service from Xfinity to DirecTV. By simply changing the Channel Up Macro assigned to the Channel Up Tag to reflect the new command of Channel Up DirecTV Genie, you have now successfully updated that command across all devices and pages that were Tagged with Channel Up. In this case, the Channel Up buttons highlighted above in green for the T1-B+, T2X, and KX-7 were all updated in one simple step.

Macro Types		
	Global Macro	Global macros can be called by any page on any controller in any room. So, any macros that affect the entire house/building can go here. For example, you could add a macro with a tag called “Lock front door”. There is only one front door so there will be no conflicts with that tag in other rooms. Then you can add the tag to a button called “Lock front door” on any page, on any controller, in any room and it will call that global macro when the button is pressed. **Priority:** Global macros are the lowest priority; any other macros types with the same tag will override global macros.
	Source Macro	Source macros are for control of a particular source device (ex. Cable box). Source macros are all grouped together so that it is easier to find where those macros are and replace them if a source such as a cable box is replaced by a different model, or by a satellite TV receiver. You should only put macros in a source that control that source. For example, for your cable box source, you wouldn’t have commands to turn on the TV or control the volume of the TV - this is to avoid hunting through all of the source macros to find the TV commands if you change the TV to a different model. **Global or Room Source:** The availability of Tags tied to a Source Macro will be determined by whether the Source is a Global Source or a Room Source. If the Source is Global it may be accessed by all Rooms and Devices. If the Source is in a Room, it may only be accessed by Devices also listed in that room. **Priority:** Source macros are the third highest priority, behind room and controller macros. Source macros will override global macros.
	Room Macro	Room macros can be called by any controller in a room, no matter what the source is for the currently selected page on the controller. A room macro will be associated with any buttons with that tag on every page on every controller in that room. A common case for using a room macro is if you have a receiver that controls the volume for a room no matter what the currently selected source is. You can then create a single macro in a room for the “Volume Up” command, and that macro will get called for all buttons with a “Volume Up” tag on any page in that room. A room macro is also a good place to create activity macros (i.e. a “Watch TV”, or “Listen to Spotify” macro). Those macros can then be used by any controller in the room. Another common case for room macros is for “scene” macros that affect a particular room. **Priority:** Room Macros are the second highest priority, behind controller macros. Room macros will override source or global macros.
	Controller Macro	Controller macros are associated with a single controller. In most cases, you want to make macros available to any controller in a room. Therefore, you the use of controller macros should be limited to scenarios where the macro must run on the controller. One example for a controller macro is if you need to send IR directly from a remote control. In that case, you need to create a standalone macro (standalone macros can only be used in controller macros). Another example is the “button pause” macro step, that can’t run on a processor, so those can also only be used in a controller macro.

		Controller Macros give you the option to add a page link. This will allow you to make a page flip happen when a button is pressed. You can link to specific pages on your device, or to Global and Room Source Pages. **Priority:** Controller macros are the highest priority, if you have a controller macro for a certain tag, it will override any other macros associated with that tag.

Variable Types		
	Global Variables	Global variables can display text or provide state information to buttons on any page on any controller in any room. So, any variables that effect the entire house/building can go here. For example, you could add a variable with a tag called “Outdoor Temperature” and connect the button text portion of the variable to the temperature variable provided by the weather driver. Then on any page on any device if you have a tag called “Outdoor Temperature” in the button text, it will display the current temperature. **Priority:** Global variables are the lowest priority, any other variable with the same tag will override global variables.
	Source Variables	Source variables are where to put variables that display text or provide state information for a source device. For example, a receiver might provide information about the current song title being played. You could add a variable with a tag called “Song Title” to the source. Then any buttons on pages for that source that have a tag called “Song Title” in their text will display the song title. **Priority:** Source variables are the third highest priority, behind room and controller variables. Source variables will override global variables.
	Room Variables	Room variables are variables that can be associated with buttons on any controller in the room, no matter what the source is for the currently selected page on the controller. A room variable will be associated with any buttons with that tag on every page on every controller in that room. A common case for using a room variable is if you want to display the current volume on every page in a room. **Priority:** Room variables are the second highest priority, behind controller variables. Room variables will override source or global variables.
	Controller Variables	Controller variables are macros that are associated with a single controller. In most cases, you want to make the variables available to any controller in a room, so there is rarely a reason to add a controller variable. **Priority:** Controller variables are the highest priority, if you have a controller variables for a certain tag, it will override any other variables associated with that tag.

Selecting Variable Types	
Internal Variables	Internal Variables are the Variables that are built in to the processor's hardware. These variables can differ depending on whether you are using a Standalone Device, a RP, or a XP series processor.
Driver Variables	Driver Variables are based on what Drivers you currently have loaded in your project.
ZW-9 Device Variables	When using the Z-Wave Manager tool it creates a driver for your Z-wave Devices. These Z-Wave Devices are nested under ZW-9 Device Name when you go to Select a Variable type.
XP Macro Flags	XP Macro Flags consist of 256 flags that you can use to build logic and track/simulate button states.

Helpful Tips for Using Variables		
Variable Type	Fields	Details
Button Text	Text	The Button Text field of the variable editor lets you configure text to be displayed on a button. It is important to note that unlike the other fields on the variable editor form, the button text is not tied to the tag that is assigned to a button. Instead, in the button text editor, you insert tags where you want the text to appear. This allows you to insert multiple tags in the text, or to have a tag in the text with an annotation (i.e. temperature followed by °F). To get Variable Text to appear on a button, Right Click on the button and select Edit Text. Once the Edit Text window opens you will able to click on Insert Tag on the upper right side of the toolbar. Then you can either select an existing tag from the drop-down box, or type a tag name to create a new tag. The variable will then appear as hyperlinked {var} in your Edit Text box. If you click again on the now hyperlinked {var} it will show you the Tag that is now associated. You can also change Tags in this window. You can also select Insert Control Variable and pick your Variable from the drop-down fly out panes. This will allow you to insert a variable that will not be associated with a Tag. While it will give you Variable Text Feedback on your object it is not recommended to add in variables this way, since it doesn't give you the benefit of sharing variables between pages and devices that you get with tags.
Button States	Reversed Inactive	The Reversed, Inactive, and Visible fields of the variable editor let you assign variables that control the state of a button. Any buttons

	Visible	that have the selected tag assigned to them will then reflect the specified state.
Item List Object	State Command	If the tag for the selected variable has an item list associated with it, then these fields in the variable editor will become enabled. The State field can be assigned to a variable that will be used to populate the contents of the list. The Command field can be assigned to a command that will be run when the user selects an item in the list.
Toggle Button Object	State	If the tag for the selected variable has a toggle button associated with it, then the state field in the variable editor will become enabled. The State field can be assigned to a variable that will be used to show the toggle state of the button. The command field is not used for toggle buttons, instead, create a macro with the same tag name. That macro will then be run when the toggle button is pressed.
Slider/Gauge Object	Value Command	If the tag for the selected variable has slider or gauge associated with it, then these fields in the variable editor will become enabled. The Value field can be assigned to a variable that will be used to show the current level of the gauge or slider. The Command field can be assigned to a command that will be run when the user touches and slides their finger on the slider.
Image List Object	Index	If the tag for the selected variable has an image list associated with it, then this field in the variable editor will become enabled. The Index field can be assigned to a variable that will be used to select which image in the list will be displayed.

Event Types		
	Events	Events can be used to trigger a macro without input from a user. A processor has built-in events such as Sense, Periodic, Daily and Startup events which apply to the whole system, and which can be configured to call a macro in any room when triggered.
	Driver Events	A driver can also implement events. In the workspace under the Drivers section of the Global area, you can view a list of all the events supported by a driver, and you can create a macro there that will be called when the event is triggered.
	Source Events	A source that is based on a driver can also have events. The events for a source are a subset of the events listed for the driver, showing only the events that apply to that source. Modifying the macro in either the Driver or Source events list will also modify the macro in the other list.

MACRO TYPES

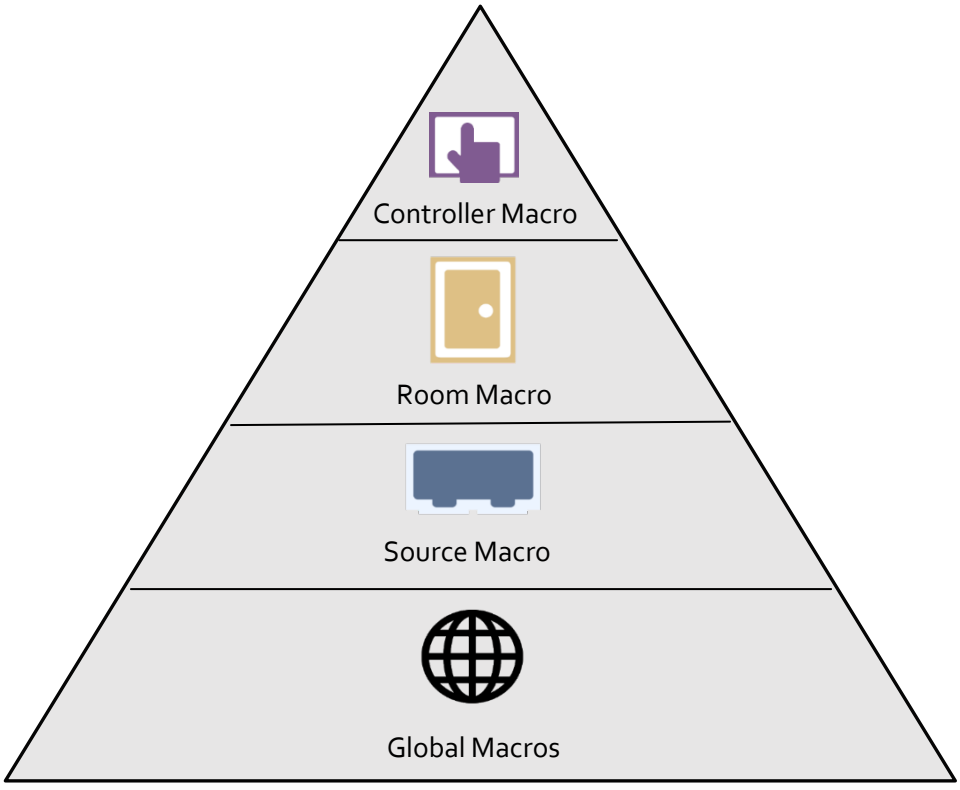
Controller Macros – Unique to the controller they are created on
Should rarely be used. Best used for one-off functions such as standalone IR commands.

Room Macros – Available to all devices in a room
Used for creating room specific scenes and functions shared by all room devices.

Source Macros – Available to a single source device
Are the default macro type used in most programming.

Global Macros – Available to all rooms and controllers
Should only be used when creating tags to be shared by all rooms and devices.

MACRO TYPES PRIORITY



(Utilize the same priority for Variables)

RTI Devices

Keypads

RK-1+

RKM-1+

KX-3

KX-7

Handhelds

T1-B+

T2X

Z-Wave

ZW-9

Dimmer

Anywhere

Antenna

ZM-24

Audio Distribution

AD-4X

Processor

XP-8s

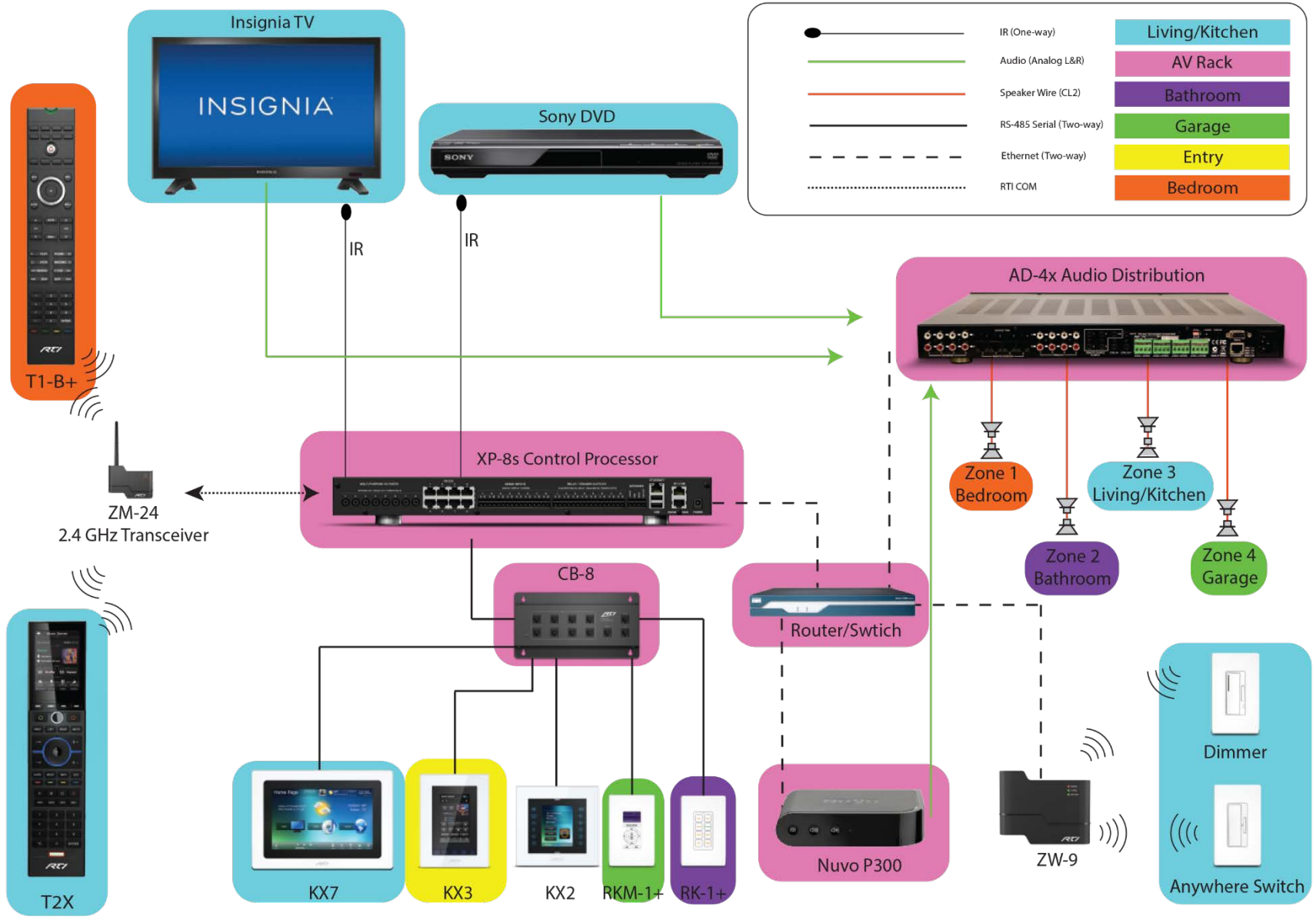
Sources

TV

Nuvo

DVD Player

Floor Plan


Insignia TV
INSIGNIA
Sony DVD
SONY
IR
IR
IR (One-way)
Audio (Analog L&R)
Speaker Wire (CL2)
RS-485 Serial (Two-way)
Ethernet (Two-way)
RTI COM
Living/Kitchen
AV Rack
Bathroom
Garage
Entry
Bedroom
AD-4x Audio Distribution
T1-B+
ZM-24
2.4 GHz Transceiver
XP-8s Control Processor
Zone 1
Bedroom
Zone 3
Living/Kitchen
Zone 2
Bathroom
Zone 4
Garage
CB-8
Router/Swtich
T2X
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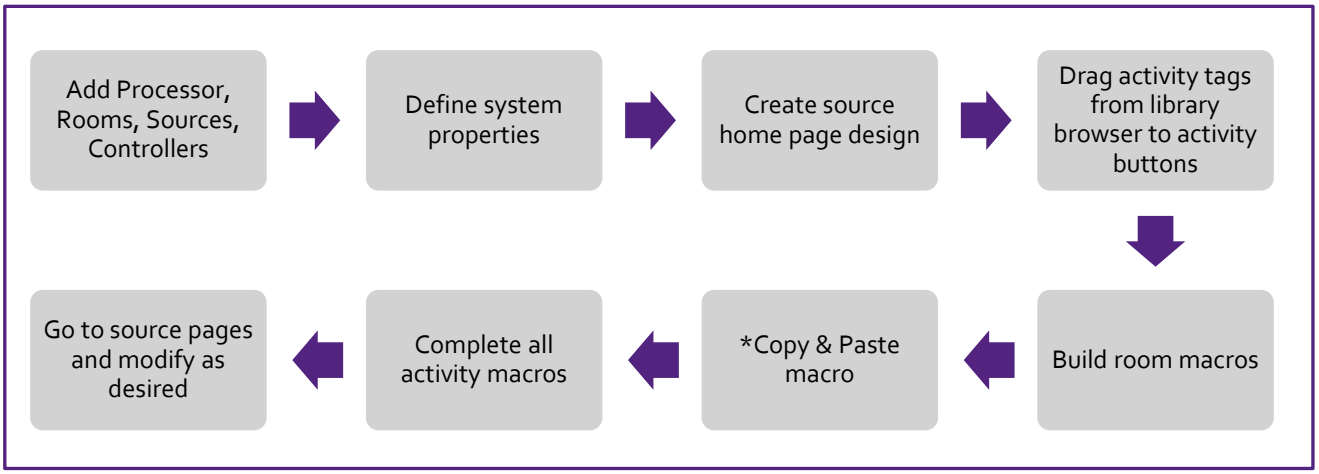
KX2
RKM-1+
RK-1+
Nuvo P300
ZW-9
Dimmer
Anywhere Switch

RECOMMENDED WORKFLOW



1. Create System Configuration - When adding Rooms and Sources it is best to identify a naming convention before you begin. Example: Change source label from - DirecTV - Set Top Box - H/HR and Genie Series Satellite All Models Address 2 - To- DirecTV – Family Room

A. Add Processor
B. Add Rooms
C. Add Sources
D. Add Controllers

2. Define System Properties – Make all necessary setting updates to your processor, source drivers, and controllers.

3. Create Source Home Page Design - Create the "Home Page" button layout design. (Right click or use the tool bar.) Click on a button and drag over your activity bitmap.

4. Drag Activity Tags from the Library Browser on to the Activity Buttons - Activity Tags are auto-generated based upon the sources added to your workspace. They include a page link that is hidden in your tag.

5. Build Room Macros – Click on any of your activity buttons with an activity tag (noted by a green check mark), navigate to the macro tool bar and select "Room Macro." You will be redirected to the macro list view. At the top, you will see your activity tag is highlighted and currently states that there is not a macro created. In the library browser (see workspace overview), click on sources in "macro steps" and build out your macro for the respective tag.

6. Copy & Paste Macro – Select the next activity tag in the top of the macro list above. Considering that most activities encompass the same macros simply copy and paste (Control+C, then Control+V) on to the next activity. Then make the necessary adjustment to the macros.

7. Complete all Activity Macros – utilizing step #6, continue until you're completed.

8. Go to Source Pages and Modify as Desired - Go back to the workspace and click on the source that corresponds to your "Watch TV activity tag." For example, you can start with your channel presets. From the library browser, select your channel bitmaps and add them to your button presets. (The place holder text -preset will stay. This will not transfer when you download your system file to the processor.) Edit the tag preset 1 to include the channel name. Since this is a source, select source macro. You should now be in the macro editor view. In the library browser, click on the macro steps. Go to sources at the bottom and select DirecTV and then double click direct tuning and enter your major channel number.

In the case of multi-room systems, it is recommended that you follow the same workflow for each room. Keep in mind that you can copy and paste macros, duplicate controllers and merge pages. These time-saving tools are typically accessed at the top of your configuration pages and or using a right click on your mouse.

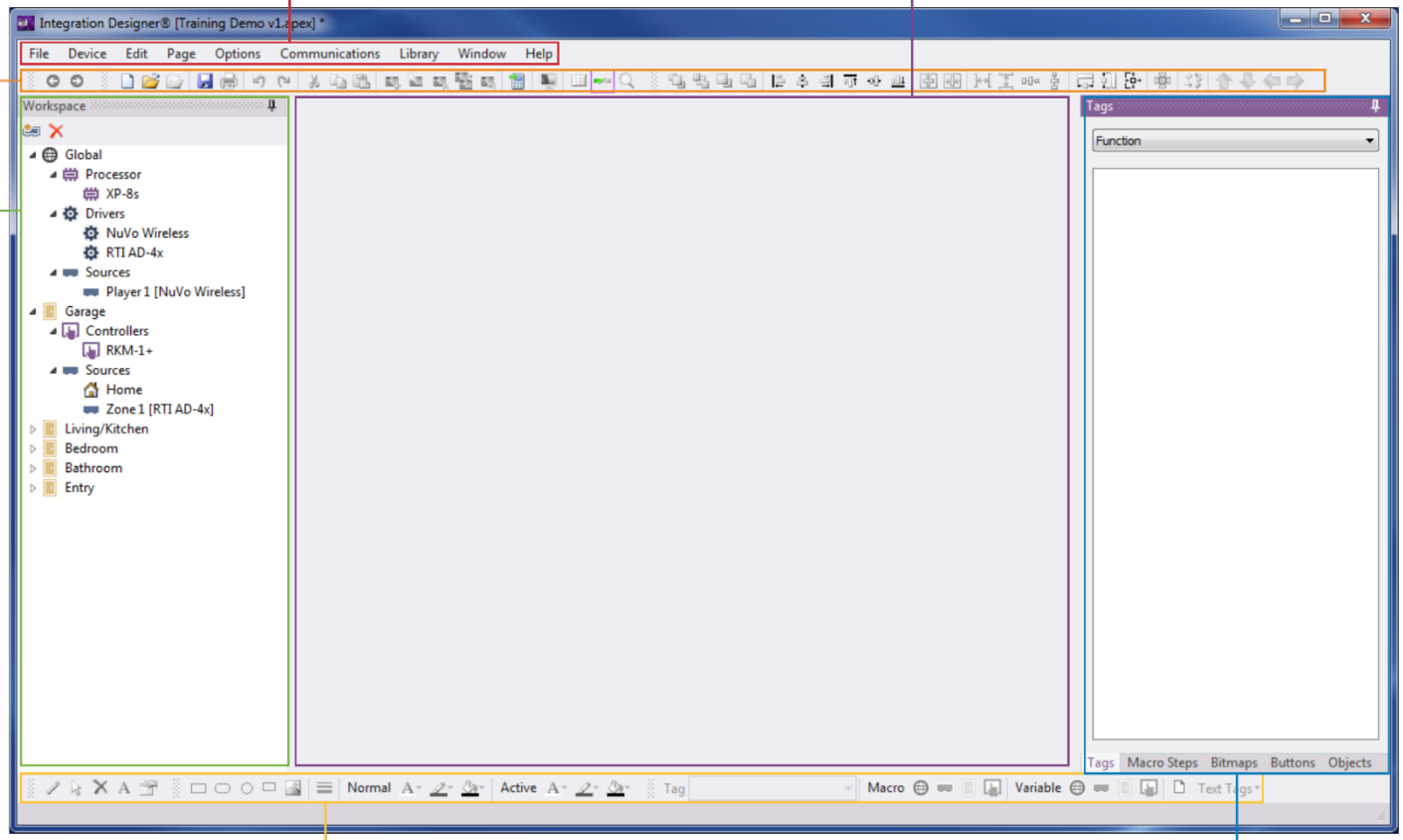
While RTI is known for its flexibility in programming, this workflow will be critical to helping you navigate the Integration Designer APEX software successfully to build efficient programming behaviors.

Top Tool Bar
Create, Open, and Save Projects. Add, Merge, and Delete Pages. As well as fine tune graphics.

Menu Bar
Access to Menu Items, Send Files, Adjust Windows, and Get Help.

Device Workspace
Workspace will change to reflect what is selected in your Device Workspace.

System Workspace
This is where your Processors, Drivers, Sources, Rooms, and Controllers are Listed.



Bottom Tool Bar
Draw Shapes, Text, and Objects. Create Tags, Macros, and Variable.

Library Browser
Easily Access Tags, Macro Steps, Bitmaps, Buttons, and Objects

NOTES

NOTES

GLOSSARY OF TERMS

Term	Description
2.4GHz	Operating frequency for the **two-way** communication between remotes and processors
433MHZ	Operating frequency for **one-way** communication between remotes and processors
Active State	Pushed or latched state of a button
Bitmaps Tab	Location to access any image included or imported into APEX for use on devices with screens
Button Bitmap	The physical look of a button on the screen, typically a two layer image for press and released state, not the physical button itself
Button Icon	Single layer image on a button, usually on top of a button bitmap
Commands	An IR, RS-232, Z-Wave, or IP executable function that is attached to a button
Control Variable	Feedback that is represented by an object, gauge, or text
Controllers	Any device or surface that the end user interacts with to control other devices "Such as a remote control, touch panel, keypad, or virtual panel"
Convert To…	Allows processor's or remote's information to be transferred to a compatible device
Daily Event	An Event that resides on the processor that can be programed to run at various times/days repeatedly
DDNS	Dynamic Domain Name System, used for remote access to control a system
Device	A Processor, Remote, Touch panel, or Expansion Device
DHCP	Dynamic Host Configuration Protocol, automatically assign buttons and images
DNS	Domain Name Servers (DNS) are the Internet's equivalent of a phone book. They maintain a directory of domain names and translate them to Internet Protocol (IP) addresses.
Driver	Any two-way module provided by RTI or a third party
Dynamic Image	An image that’s state changes based on feedback
Expansion Device	A device that is tied to a processor VIA MAC or IP Address. Can include slave processors, z-wave controllers, and relay/port input devices
Frame	One of a set of pages that share the same programming for the hard keys on the device.
Function	An activity that is intended to complete a task.
Global	A macro, variable, or text that can be assigned across all rooms and devices
Grid	Plot points that help you to align your graphical interface.
GUI	The graphical user interface, is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators
Hard Buttons	Physical rubber or plastic buttons on the face of a controller
Inactive	Button property that disables the ability for the button to be pressed
IR	Infrared communications for line of sight control from a handheld controller or through an emitter
IR Library Manager	Standalone IR manager for the organization, learning, and testing of IR codes
ISP	Internet Service Provider
LAN	Local Area Network, devices downstream of the local router/modem

Macro	A single command that executes a set of instructions to perform a particular task
Merge Pages	Bring pages from a like device into your project from other device in your current or another project.
Metadata	Information that is sent from a driver and populates text, graphics, or states.
Network	A number of interconnected computers, machines, or operations
Objects	A container that performs a pre-scripted task
Page	A space where a graphical buttons, objects, or text can be added to create a GUI for remote functions
Page Link	An assignment or macro that tell a page to jump to another
Page sets	A group of related pages that can have their own set of macros and variables
Periodic Event	An event that runs a macro every pre-determined amount of time
POE	Power Over Ethernet
Processor	The primary intelligent device that facilitates communication between controllers and devices in the system
Processor Events	Events that happen on the processor independently of any controller
Relay	An electrical device to open or close another circuit.
Remote	A component of an electronic device used to operate the device wirelessly from a distance
Reversed	To change to an opposite state.
RF	Radio Frequency
Room	A space that can be programmed an set up independently from global
RS-232 Library Manager	Standalone RS-232 manager for the organization and entry of serial strings
RTIPanel	RTI's app name for both Android and iOS
One Way Scrolling List	A list with pre-populated text/graphic options to select from
Two Way Scrolling List	A list with text options that you can pull form that are dynamically pulled from a device by a driver
Sense Event	A macro that is executed based on voltage being introduced
Serial	A communication interface through which information transfers in or out one bit at a time
Soft Buttons	Button that are represented by graphics on a touchscreen
Source	A device that is being controlled via IP, IR, RS-232
Startup Event	An event programmed on the processor that runs immediately when the processor first boots up after a disruption of power
Static IP	A manually chosen IP address assigned outside of DHCP range
Tag	A labeling device indicating a unit of information
TCP/IP	The basic communication language or protocol of the Internet. It can also be used as a communications protocol in a private network
Template	A premade graphical interface.
Toggle	Alternate between two commands or states
Two Way Item List	A list that pulls content from a driver
Variable	Dynamic feedback based on a state

WAN	A computer network that extends over a large distance
ZigBee	A type of encrypted 2.4Ghz communication
Zone	A pre-defined area
Z-wave	A type of encrypted 908.42 MHz communication
Proximity Sensor	Identifies when objects become located inside of its' range
Ambient Light Sensor	Measures the ambient light in the area and can adjust screen brightness accordingly
Backlight	Illumination from behind.
One-Way	Commands are sent with no feedback
Two Way	Commands are sent with the ability to receive feedback where applicable