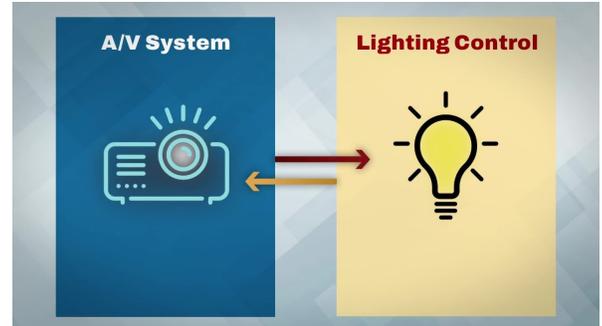




## Summary:

What is A/V integration? A/V integration is the process of allowing an A/V system and a lighting control system to communicate with each other. Integration allows the A/V system and lighting control system to share status information and control commands. Integration allows a user to view and control both systems from



## Example:

An example could involve the wall station of the lighting control system. Integrating the lighting control system and the A/V system would allow the user to press a “Presentation” button on the wall station that would dim the lights AND tell the A/V system to lower the projection screen and turn on the projector. Likewise, pressing a “Presentation” button on the A/V system’s table top control should result in the same action. Irrespective of which interface was used, the wall station or table top control, both should result in the same behavior and both should indicate the current state.

## How to Communicate:

The first requirement is to determine what form of communication is to be used. The four most common methods are listed below. Included in this list are the pros and cons of each. Touché uses RS-232 since it is the most widely adopted and it offers a great balance between flexibility, security, and ease of implementation.

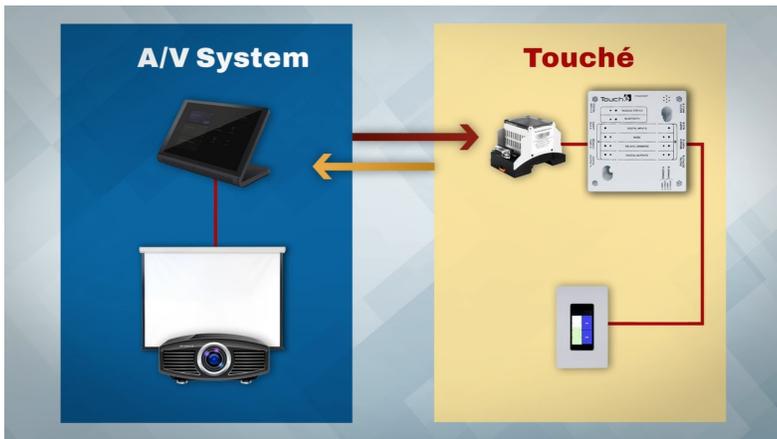
Protocol	Wiring Topology	Flexibility	Security	Troubleshoot
Contact Closure	Uses dry contacts.	Not Flexible	Secure	Easy
RS-232	Uses point-to-point structure.	Flexible	Secure	Moderate
Ethernet/IP	Uses networked structure.	Flexible	Difficult to Secure	Difficult
RS-485	Uses multi-drop, multi-node structure.	Flexible	Secure	Difficult

Touché leverages the fact that all of the Room Managers have built-in Ethernet connectivity to communicate between Room Manager gain the benefits of using an Ethernet/IP connection without the security issues and troubleshooting challenges, but more on that later.



As noted earlier, Touché uses RS-232 as the communication protocol between an A/V system and the lighting control system. RS-232 is a standardized serial communication protocol that has a defined wiring structure and communication structure.

**The wiring structure.** First, a Room Manager must be used as the room's lighting controller. A SmartPack does not support communication with an A/V system. Second, a CI-RS232 must be used as the translator for RS-232 communication. This module is called an RS-232 Communication Interface. This module can be used to communicate with any other system that support RS-232 communication (i.e. motorized shade system), but in this example we are demonstrating how it is used to communicate with an A/V system.



As the figure shows here, the CI-RS232 module is simply plugged into the branch port of a Room Manager (it can share the same port with other branch devices like wall stations). It gets power and communication from the Room Manager via a standard CAT5 cable.

On the other side of the CI-RS232 there is a DB9 port. This is a standard termination for connecting RS-232 devices together, but other forms do exist (RJ-11, and RJ-45). If the A/V system that is being connected to uses one of these types of termination, then a cable must be constructed or purchased that connects the correct pins at each end. Getting the correct cable with the correct terminations and pin pairing is the most common problem that Touché sees when interconnecting an A/V system and the CI-RS232. If the A/V system uses a DB9 port then the only item to consider is the gender of each end (male or female). If the A/V system uses an alternative termination like RJ-45 then a more thorough review of the connection of both ends must be completed.





**The communication structure.** The communication structure is the communication parameters that must be set up on both ends for the two systems to communicate. The following is a table representing the communication parameters. The highlighted parameters represent a typical configuration.

Baud Rate	Data Bits	Parity	Stop Bits	Flow Control	Handshaking
1200	5	None	0	Software	Enabled
2400	6	Odd	1	Hardware	Disabled
4800	7	Even	2	None	
9600	8				
19200					
38400					
57600					
115200					

A definition of each parameter is provided below:

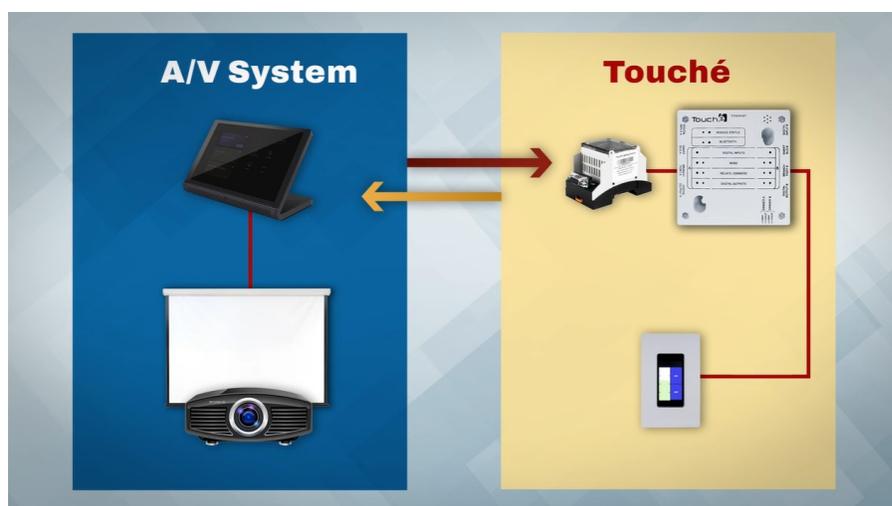
Baud Rate:	Speed at which the two systems communicate
Data Bits:	The quantity of bits in each piece of the message
Parity:	Error checking mechanism
Stop Bits:	The number of bits representing the end of a message
Flow Control:	A method of managing the rate of data transmission
Handshaking:	Another level of error checking

If this all sounds Greek, don't worry. The important thing to remember is that they must match on both ends. This is done in the A/V configuration software on the A/V system side and the configuration APP on the Touché lighting control system side (that is the same APP used to configure anything in the Touché network).



**The message structure** Messages are sent between the two system unidirectionally (one-way) or bi-directionally (two-way). Touché support bi-directional communication meaning the messages can be sent from the lighting control system to the A/V system or vise-versa. Messages are comprised of a series of printable ASCII characters followed by a carriage return (<CR>). In laymen terms this means any character that you can type on a keyboard can be part of the message and the end of the message is the return key. It is that simple. Using this type of message structure allows messages to be human readable. In other words the

message to turn the lights on high from the A/V system can be “lights high.” A message to the A/V system to go to presentation mode can be “presentation mode” (assuming the A/V system support human readable messages). The only criteria is that both ends (the lighting control system and the A/V system) have to be able to interpret the command. Some systems have a pre-defined

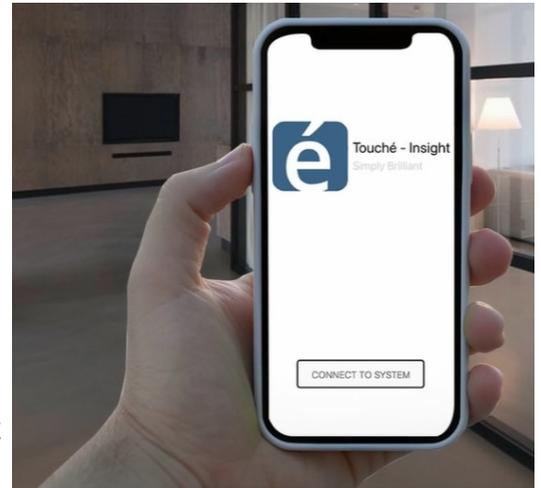


command set. This means that the person integrating the two systems has to look up what they are wanting to do form a list of commands and then use the command (ASCII string) for the desired function. Touché does not have a predefined command set, the commands can be any ASCII string. This works both ways for Touché, the commands being received from the AV system can be any ASCII string and the commands to the AV system can be any string.

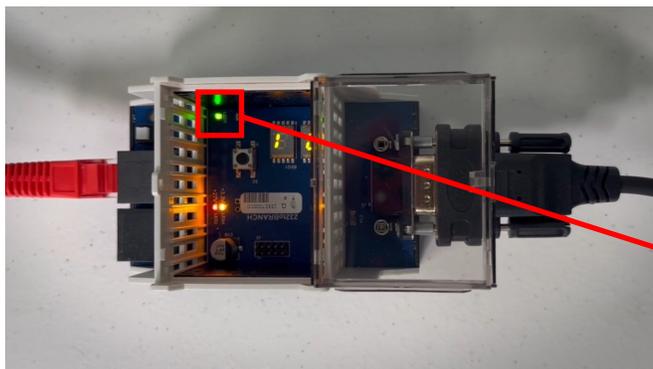
Even though Touché supports human readable messages in both directions, some A/V systems do not. Some A/V systems use a pre-defined command set, so for those instances, the person integrating the two systems will need to look up the commands of the A/V system and use the pre-defined command strings in the messages from the lighting control system to



**Set-up & Commissioning** Earlier it was noted that Touché uses a free smart phone APP to configure the CI-RS232 module for the correct communication parameters. The same APP is used to create the event and command ASCII strings for the messages. A command message is a message sent from one system to the other. An event message is that is received by one of the systems. Every message between systems will start as a command and end as an event. For example, if we want the lighting control system to tell the A/V system to start a presentation mode, we first need to determine if there is a specific command that the A/V system requires in order to enter that mode. Many of the commercial grade A/V systems allow for customizable messages (just like Touché). If this is the case, then we simply need to make sure the same ASCII string is used by both systems for presentation mode. In this case we could simply use the message : “presentation mode<CR>“ (remember that a <CR> is required at the end of a message to tell both systems where the message ends). If the A/V system has a pre-determined message to enter presentation mode, then we would simply use that ASCII pre-determined string.



To aid in testing whether the integration is working, Touché has added a status LED to the CI-RS232 module. As the figure below demonstrates, if the module is sending (i.e. the lighting control system is sending a message) then the module will blink red. When it is receiving it will blink green. This indication will be in real-time. In other words when a button is pressed on the wall station to enter presentation mode, the wall station will tell the Room Manager to enter this mode and the Room Manager will tell the CI-RS232 module to send the ASCII string. So when the button on the wall station is pressed, the CI-RS232 will blink red.



RED = SEND

GREEN = RECEIVE



## Conclusion:

Touché has made integration with A/V systems simple. Using a common interface module, the CI-RS232, to communicate with multiple types of systems (including A/V systems), using the same APP to configure the integration as is used with the configuration of the lighting control system, and being able to provide the same remote support through the APP—even for the A/V integration, is what sets Touché apart from other lighting control manufactures.

Wait, there was one more promise made in this document that hasn't been addressed. Earlier it was noted that using Ethernet/IP for integration between A/V systems and the lighting control system increased the security risks and complexity. It was also mentioned that Touché uses our built-in Ethernet network to communicate between Room Managers. If you want to connect an enterprise level A/V system to the entire Touché lighting control network of Room Managers, is that possible? The answer is yes. A single CI-RS232 module can be connected to any Room Manager and that Room Manager can share system wide A/V control commands with any other Room Manager through the eNet Touché network. For more information on this level of connectivity, stay tuned, a new Touché-Tech document is in the works . . .