

APPENDIX A Sundara-Rajan alone or in view of Kremin '926 U.S. Patent No. 9,977,519

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
Claim 1 (Ind. Claim) 1[pre] A processing system for an input device, the processing system comprising:	Sundara-Rajan discloses an input device with a processing system. Specifically, in Figure 20, Sundara-Rajan discloses a computing device 104 that has a touchscreen module 2026 and touch screen controller 2028, as well as a display 2012 that may have a touch surface 106 which are understood to be input devices. Sundara-Rajan, at 18:11-63; ’519 Patent at 1:24-27 (“Input devices including proximity sensor devices (also commonly called touchpads or touch sensor devices) are widely used in a variety of electronic systems.”). The computing device 104 also has controller(s)/processor(s) 2004 that may each include a central processing unit (CPU) for processing data and computer-readable instructions. Sundara-Rajan, at 18:11-63.	Kremin ’926 discloses an input device with a processing system. Specifically, in one embodiment, Kremin ’926 shows “an electronic system having a processing device for detecting a presence of a touch object and a stylus.” Kremin ’926, ¶0006.

FIG. 1

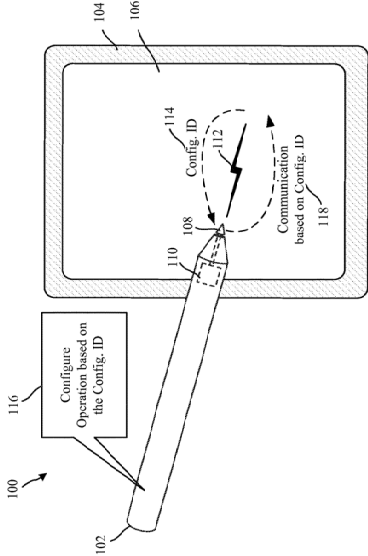
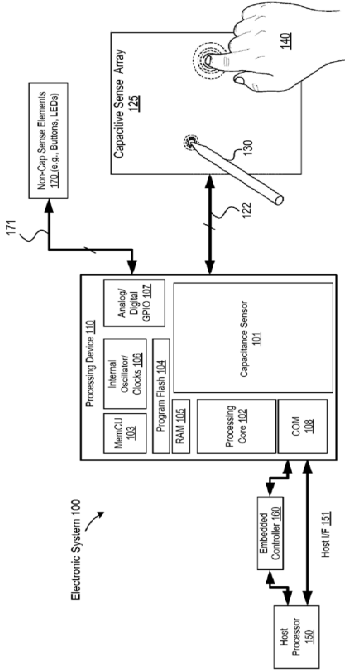
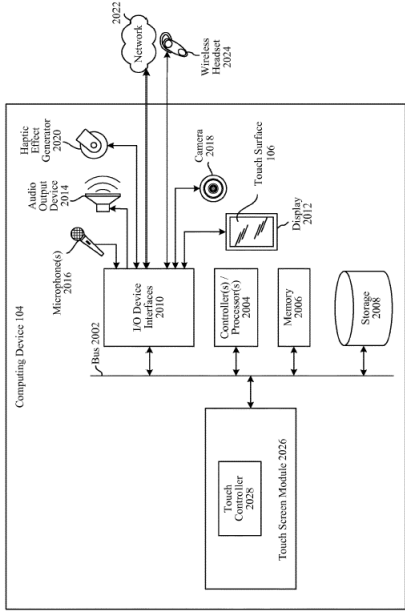
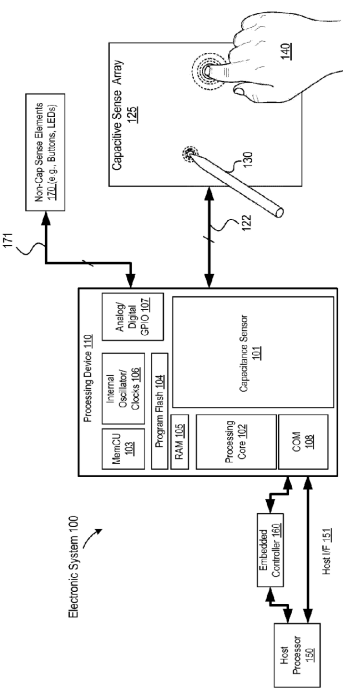
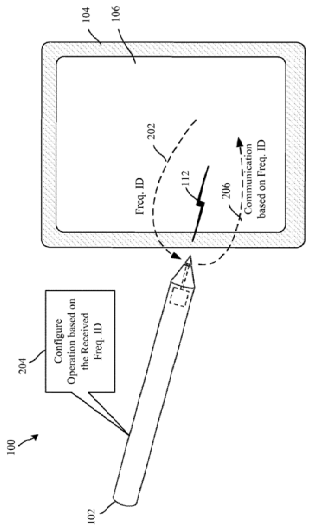
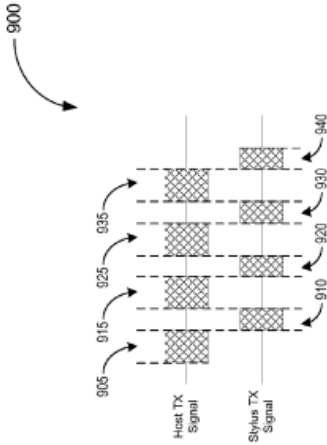


FIG. 1



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1[a] a sensor module coupled to sensor circuitry and configured to:	FIG. 20  The diagram illustrates the internal architecture of Computing Device 104. At the top, external components include a Haptic Effect Generator 2020, an Audio Output Device 2014, Microphones 2016, a Camera 2018, and a Touch Surface 106. These are connected to an I/O Device Interface 2010. The I/O Device Interface 2010 is also connected to a Bus 2002. Below the bus, the system includes a Controller(s)/Processor(s) 2004, Memory 2006, and Storage 2008. A Touch Screen Module 2026 is shown at the bottom, containing a Touch Controller 2028. The Touch Screen Module 2026 is connected to the Controller(s)/Processor(s) 2004. The Controller(s)/Processor(s) 2004 is connected to the Bus 2002, which in turn connects to the I/O Device Interface 2010. The I/O Device Interface 2010 is connected to the external components: Haptic Effect Generator 2020, Audio Output Device 2014, Microphones 2016, Camera 2018, and Touch Surface 106. The Touch Surface 106 is also connected to the Touch Screen Module 2026. A Wireless Headset 2024 is shown at the top right, connected to the I/O Device Interface 2010 via a Network 2022.	Kremin’926 discloses a sensor module coupled to sensor circuitry. Specifically, Kremin’926 discloses a “capacitance sensor 101” which “may be integrated into processing device 110. Capacitance sensor 101 may include analog I/O for coupling to an external component, such as capacitive sense array 125, touch-sensor slider (not shown), touch-sensor buttons (not shown), and/or other devices. The capacitance sensor 101 may be configured to measure capacitance using mutual capacitance sensing techniques, self capacitance sensing technique, charge coupling techniques or the like. In one embodiment, capacitance sensor 101 operates using a charge accumulation circuit, a capacitance modulation circuit, or other capacitance sensing methods known by those skilled in the art.” Kremin’926, at ¶0023. The “[c]apacitance sensor 101 may be integrated into the IC of the processing device 110.” <i>Id.</i> ¶0028.

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1 b initiate a current beacon period comprising a plurality of timeslots by broadcasting, to a plurality of active pens comprising a first active pen, a current beacon signal comprising an upstream packet for the first active pen and specifying a pen identification (ID) associated with the first active pen;	Sundara-Rajan discloses a sensor module that initiates a current beacon period comprising a plurality of timeslots. Specifically, Sundara-Rajan discloses a frequency ID, which a POSITA would understand to be a plurality of timeslots, in Fig. 2, "the device 104 may transmit a frequency ID, illustrated as 202, to the stylus device 102 via the carrier frequency. In this example, the frequency ID may correspond to a frequency the computing device 104 desires to operate on. The stylus device 102 configures its operation according to the frequency corresponding to the frequency ID, illustrated as 204. The stylus device 102 then communicates with the computing device 104 using the frequency, illustrated as 206. The frequency ID, or other content, may be communicated between the computing device and the stylus device using a Bluetooth message, a WiFi message, an infrared message, electromagnetic (e.g., capacitive, inductive, resonance, radio frequency backscatter, etc.) message, or a haptic message." Sundara-Rajan, at 4:37-4:50.	 FIG. 1 Kremin'926 discloses a sensor module that initiates a current beacon period comprising a plurality of timeslots. Specifically, Kremin'926 discloses that the active pen "stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940)." Kremin'926, at ¶0067.

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	FIG. 2  Sundara-Rajan discloses that “the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency.” Sundara-Rajan, at 4:24-4:26. “The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information.” <i>Id.</i> at 4:26-4:28. A POSITA could reasonably expect that such “other information” could include a pen ID. It would be obvious to a POSITA that the embodiments disclosed in Sundara-Rajan could apply to a plurality of active pens.	 FIG. 9 Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See id.</i> ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Kremin’926 discloses that the timing and phase of the TX signal from the host device may be calculated from the encoded data the active pen receives. <i>See id.</i> ¶0061 (“In another embodiment, the any combination of the frequency, timing, and phase of the TX signal 727 may be calculated from data encoded in the synchronization burst 729.”). Kremin’926 also discloses that, “In one embodiment, this synchronization may be performed using one or more of the electrodes of the sense array 201 to transmit a synchronization signal 230 to the active stylus 130. The active stylus 130 may detect (e.g., sense) and demodulate the synchronization signal 230 using receiver 226. The MCU 224 may process the

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		synchronization signal 230 to synchronize the timing of the sensing performed by the processing core 210 and the transmission of the TX signal 227 by the active stylus 130." <i>Id.</i> at ¶0036. A POSITA would understand that "the synchronize . . . the transmission of the TX signal by the active stylus" could mean that the demodulated synchronization contains information regarding the TX signal transmission such as timing and frequency. A POSITA would combine Sundara-Rajan's teaching of the host device transmitting a configuration ID with other information (including, reasonably, a pen ID) with Kremin '926's disclosures. Sundara-Rajan is directed to an active stylus that is capable with communicating with "a multitude of touch controllers" but provides minimal detail on how to use more than one active stylus simultaneously. Sundara-Rajan, at 3:2-3:9. A POSITA would thus look to Kremin '926's specific disclosure of simultaneous use of multiple touch objects (such as multiple active styluses) with a single touchscreen.
1[c] receive, during a first timeslot, a first downstream packet from a first active pen transceiver of the first active pen; and	Sundara-Rajan discloses an active pen with a transceiver. For example, the stylus disclosed in Sundara-Rajan can "function as an electrode(s) to transmit and receive information over the capacitive communication channel." Sundara-Rajan at 4:55-4:62. Because the active pen can both receive and transmit information and signals, a POSITA would understand that it has a transceiver. Sundara-Rajan discloses that the stylus "may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as	Kremin '926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin '926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. <i>Id.</i> ¶0061. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> Because the active pen can both receive and transmit information and signals, a POSITA would understand that it has a transceiver.

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	block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. A POSITA would understand this to be a downstream packet.	
1[d] receive, during a second timeslot, a second downstream packet from a second active pen transceiver; and	It would be obvious to a POSITA that the embodiments disclosed in Sundara-Rajan described in 1[c] could apply to a second active pen because Sundara-Rajan states “the term ‘a’ or ‘one’ may include one or more items.” Sundara-Rajan, at 20:8-20:9. Therefore, a POSITA would interpret the features of the “stylus device” in Sundara-Rajan to apply to one or more pens. Furthermore, a POSITA would understand that Sundara-Rajan teaches the ability to handle multiple pens based on the description of Fig. 20 which specifies an I/O Device Interfaces 2010 that communicates with a plurality of devices. The I/O Device Interfaces are described as allowing “[a] variety of components [to] be connected.” Sundara-Rajan, at 18:51-18:53.	It would be obvious to a POSITA that the embodiments disclosed in Kremin’926 described in 1[c] could apply to a second active pen. Kremin’926 expressly discloses that the processing device of the touchscreen “is configured to detect a presence” of both an active stylus and a touch object individually or concurrently. Kremin’926, ¶¶0020, 0017 (disclosing using electrodes to track the position of multiple touch objects). Furthermore, Kremin’926 explicitly mentions two types of styluses: “In contract to passive styluses, an active stylus 130 provides the transmit signal 227 (TX signal).” <i>Id.</i> ¶0041 Thus, a POSITA would understand that a second pen is taught by the prior art. A POSITA would also understand that Kremin’926 teaches the possibility of handling multiple pens by disclosing “the interconnection between circuit components or blocks may be shown as buses [for bidirectional communication] or as single signal lines. Each of the buses may alternatively be one or more single signal lines and each of the single signal lines may alternatively be buses.” <i>Id.</i> ¶0075. A POSITA would have been motivated to use Kremin’926’s disclosure of multiple touch objects with the disclosure of Sundara-Rajan. <i>See</i> limitation 1[d]. Sundara-Rajan is directed to an active stylus that is capable with communicating with “a

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		multitude of touch controllers” but provides minimal detail on how to use more than one active stylus simultaneously. Sundara-Rajan, at 3:2-3:9. A POSITA would thus look to Kremin ’926’s specific disclosure of simultaneous use of multiple touch objects (such as multiple active styluses) with a single touchscreen.
1[e] a determination module configured to:	Sundara-Rajan discloses the use of a Configuration ID that is passed from the touch controller to the stylus during synchronization. <i>See</i> Sundara-Rajan, at 11:11-11:20 (“The frequency synch may be followed by a 2 bit start of frame (0,0), a 3 bit identifier or identification code (also referred to herein as a configuration ID), and a 2 bit end of frame (1,1). This handshake packet may be transmitted by the touch controller about every 10 ms. In the time between transmissions, the touch controller listens for a stylus transmission that matches or acknowledges the requested operation. Once the correct stylus operation is detected, the touch controller may cease transmitting the handshake signals.”). The Configuration ID is described as “an identifier or identification code of the computing device 104, an identifier or identification code corresponding to an encoding scheme and/or an operating frequency stored on the stylus device 102, or other information for communicating a mode of operation to the stylus device 102.” <i>Id.</i> at 10:55-10:61. In response to receiving the Configuration ID, “[t]he stylus device 102 then communicates with the computing device 104 using the encoding scheme, illustrated as 118.” <i>Id.</i> at 4:34-4:36. Sundara-Rajan also discloses that “the stylus device 102 may be configured with firmware (or other code) containing a number of various modes of operation/encoding/frequency schemes that correspond to different computing devices.” <i>Id.</i>	

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	at 14:23-14:26. “The modes of operation/encoding schemes may be identified by an identifier or identification code, such as a device identifier or configuration ID, which may relate to a specific computing device.” <i>Id.</i> at 14:28-14:31. “[T]he stylus device 102 may be configured to operate with specific computing devices 104 using the device identifiers. For example, the computing device 104 or touch controller of the computing device 104 may transmit a device identifier to the stylus device 102 and the stylus device 102 may access or pull the corresponding firmware from memory and configure itself in the mode of operation/encoding scheme corresponding to the received device identifier. The stylus may then be configured to operate with the corresponding computing device.” <i>Id.</i> at 14:32-14:41. A POSITA would understand that such a device contains a determination module.	
1[f] generate the upstream packet for the first active pen specifying the pen ID; and	As discussed above in limitation 1[e], “the computing device 104 or touch controller of the computing device 104 may transmit a device identifier to the stylus device 102 and the stylus device 102 may access or pull the corresponding firmware from memory and configure itself in the mode of operation/encoding scheme corresponding to the received device identifier.” Sundara-Rajan, at 14:34-14:40. Additionally, “the touch controller may transmit configuration information to the stylus device 102 to request the stylus device 104 to operate in a certain mode. The stylus may use this configuration information to configure (1409) its operation to match the computing device 104. The configuration information may include an identifier or identification code of the computing device 104, an identifier or identification code corresponding to an encoding scheme and/or an operating frequency stored on the stylus device	

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	102, or other information for communicating a mode of operation to the stylus device 102.” <i>Id.</i> at 10:51-10:61. A POSITA would understand that the transmitted information could include a pen ID.	
1[g] determine an attribute of the first active pen comprising the first active pen transceiver from at least the first downstream packet.	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44.	Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin’926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. The stylus TX signal may include button data. <i>See id.</i> ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
Claim 2		
2[pre] The processing system of claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
2[a] wherein the first active pen further comprises the second active pen transceiver,	Sundara-Rajan discloses an active pen with a transceiver. For example, the stylus disclosed in Sundara-Rajan can “function as an electrode(s) to transmit and receive information over the capacitive communication channel.” Sundara-Rajan at 4:55-4:62. It would be obvious to a POSITA that these embodiments disclosed in Sundara-Rajan could apply to a second active pen because Sundara-Rajan	Kremin’926 discloses a stylus that receives a host TX signal and then transmits a stylus TX signal, and thus a POSITA would understand that Kremin’926 discloses a stylus with a transceiver. Kremin’926, at ¶0067 (“In one embodiment, the stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103) states “the term ‘a’ or ‘one’ may include one or more items.” Sundara-Rajan, at 20:8-20:9. Therefore, a POSITA would interpret the features of the “stylus device” in Sundara-Rajan to apply to one or more pens. Furthermore, a POSITA would understand that Sundara-Rajan teaches the ability to handle multiple pens based on the description of Fig. 20 which specifies an I/O Device Interfaces 2010 that communicates with a plurality of devices. The I/O Device Interfaces are described as allowing “[a] variety of components [to] be connected.” Sundara-Rajan, at 18:51-18:53.	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”) the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940). In one embodiment, the stylus transmits a stylus TX signal matching the phase and/or frequency of the host TX signal for a pre-determined time after the end of the host TX signal burst is detected.”). It would be obvious to a POSITA that these embodiments disclosed in Kremin ’926 could apply to a second active pen. Kremin ’926 expressly discloses that the processing device of the touchscreen “is configured to detect a presence” of both an active stylus and a touch object individually or concurrently. Kremin ’926, ¶¶0020, 0017 (disclosing using electrodes to track the position of multiple touch objects). Furthermore, Kremin ’926 explicitly mentions two types of styluses: “In contrast to passive styluses, an active stylus 130 provides the transmit signal 227 (TX signal).” <i>Id.</i> ¶0041. Thus, a POSITA would understand that a second pen is taught by the prior art. A POSITA would also understand that Kremin ’926 teaches the possibility of handling multiple pens by disclosing “the interconnection between circuit components or blocks may be shown as buses [for bidirectional communication] or as single signal lines. Each of the buses may alternatively be one or more single signal lines and each of the single signal lines may alternatively be buses.” <i>Id.</i> ¶0075. A POSITA would have been motivated to use Kremin ’926’s disclosure of multiple touch objects with the disclosure of Sundara-Rajan. See limitation 1 [d]. Sundara-Rajan is directed to an active stylus that is capable with communicating with “a
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		multitude of touch controllers" but provides minimal detail on how to use more than one active stylus simultaneously. Sundara-Rajan, at 3:2-3:9. A POSITA would thus look to Kremin '926's specific disclosure of simultaneous use of multiple touch objects (such as multiple active styluses) with a single touchscreen.
2[b] and wherein the attribute of the first active pen is further determined from the second downstream packet.	Sundara-Rajan discloses that the stylus "may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device)." Sundara-Rajan, at 17:36-17:44. A POSITA would understand that, from this information transmitted from the second downstream packet from the second active pen, the processing system would determine an attribute of the first active pen, in that it would determine that the first active pen is different than the second active pen.	Kremin '926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). See Kremin '926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. A POSITA would understand that, from this information transmitted from the second downstream packet from the second active pen, the processing system would determine an attribute of the first active pen, in that it would determine that the first active pen is different than the second active pen.
Claim 3		
3[pre] The processing system of claim 1,	<i>See supra</i> 1[pre] – 1[g].	
3[a] wherein the attribute is at least one selected from a group consisting of pen tilt, color, and erasure mode.	Sundara-Rajan discloses that the attributes communicated from button data may include switches "between an eraser mode and a write mode, or . . . other functions." Sundara-Rajan, at 5:67-6:2, 6:53-6:55. It would be obvious to a POSITA that other write modes or other functions could include pen tilt and color.	

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Claim 4 4[pre] The processing system of claim 1, wherein the determination module is further configured to:	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
4[a] determine an attribute of a second active pen comprising the second active pen transceiver from the second downstream packet.	It would be obvious to a POSITA that the embodiments disclosed in Sundara-Rajan described in 1[g] could apply to a second active pen because Sundara-Rajan states "the term 'a' or 'one' may include one or more items." Sundara-Rajan, at 20:8-20:9. Therefore, a POSITA would interpret the features of the "stylus device" in Sundara-Rajan to apply to one or more pens. Furthermore, a POSITA would understand that Sundara-Rajan teaches the ability to handle multiple pens based on the description of Fig. 20 which specifies an I/O Device Interfaces 2010 that communicates with a plurality of devices. The I/O Device Interfaces are described as allowing "[a] variety of components [to] be connected." Sundara-Rajan, at 18:51-18:53.	It would be obvious to a POSITA that the embodiments disclosed in Kremin'926 described in 1[g] could apply to a second active pen. Kremin'926 expressly discloses that the processing device of the touchscreen "is configured to detect a presence" of both an active stylus and a touch object individually or concurrently. Kremin'926, ¶¶0020, 0017 (disclosing using electrodes to track the position of multiple touch objects). Furthermore, Kremin'926 explicitly mentions two types of styluses: "In contrast to passive styluses, an active stylus 130 provides the transmit signal 227 (TX signal)." <i>Id.</i> ¶0041 Thus, a POSITA would understand that a second pen is taught by the prior art.
		A POSITA would also understand that Kremin'926 teaches the possibility of handling multiple pens by disclosing "the interconnection between circuit components or blocks may be shown as buses [for bidirectional communication] or as single signal lines. Each of the buses may alternatively be one or more single signal lines and each of the single signal lines may alternatively be buses." <i>Id.</i> ¶0075. A POSITA would have been motivated to use Kremin'926's disclosure of multiple touch objects with the disclosure of

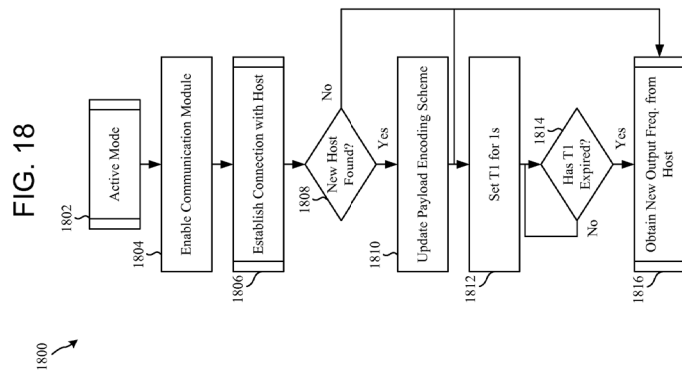
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		Sundara-Rajan. <i>See</i> limitation 1[d]. Sundara-Rajan is directed to an active stylus that is capable with communicating with "a multitude of touch controllers" but provides minimal detail on how to use more than one active stylus simultaneously. Sundara-Rajan, at 3:2-3:9. A POSITA would thus look to Kremin '926's specific disclosure of simultaneous use of multiple touch objects (such as multiple active styluses) with a single touchscreen.
Claim 7		
7[pre] The processing system of claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
7[a] wherein the attribute of the first active pen is at least one selected from a group consisting of a force measurement at a tip of the first active pen	Sundara-Rajan discloses that the claimed pen may include "a force/pressure sensor 408 (for example, an optical pressure sensor, a capacitive pressure sensor, a piezoelectric sensor, a piezoelectric resistive sensor, or other sensor capable of measuring force/pressure)." Sundara-Rajan, at 5:15-5:20. Sundara-Rajan discloses that force/pressure detected in the pen can be transmitted to the computing device. <i>See id.</i> at 5:33-5:45 ("The metallic shaft 406 coupled to the pressure sensor 408 provides a mechanical path from the tip to the pressure sensor 408 to allow the pressure sensor 408 to measure the pressure at the tip 108. The metallic shaft 406 also provides a transmission path for carrying a signal (such as, an electric field or frequency of operation to be generated by the stylus device 102) from a microcontroller or printed circuit board (PCB) of the stylus device 102 to the tip 108. This signal allows the stylus device 102 to communicate with the computing device 104, and allows the computing device 104 to determine a location (X-Y coordinates) of the	Kremin '926 discloses that force measurement at the tip of the active pen may be transmitted to the processing system. <i>See</i> Kremin '926, at ¶0063 ("The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data , button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.").

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 ("Sundara-Rajan") (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 ("Kremin'926")
	stylus device 104 in relation to the touch screen of the computing device 104.”).	
7[b] and a button status of a button on the first active pen.	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44.	Kremin'926 discloses that the active pen can transmit button data. <i>See</i> Kremin'926, at ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data , etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
Claim 9		
9[pre] The processing system of claim 1,	<i>See supra</i> 1[pre] – 1[g].	
9[a] wherein the first downstream packet is transmitted using a first frequency	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. <i>See also supra</i> regarding 1[b].	
9[b] and the second downstream packet is	Sundara-Rajan discloses that if there is noise at the frequency the embodied pen is operating on, the pen will switch to a different frequency. <i>See, e.g.</i> , Sundara-Rajan at 12:24-12:32 (“If the computing device detects noise at a	

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
transmitted using a second frequency.	current operating frequency of the stylus device (such as a pre-selected or default frequency) that interferes with stylus-computing device communications, or if the touch controller identifies a better (i.e., higher quality) operating frequency that can be used, the touch controller may start transmitting handshake packets as described above to change the stylus device's behavior to operate at a different or second operating frequency.”); <i>id.</i> at 13:24-13:39 (“If the touch controller detects noise at a current operating frequency that the computing device and stylus device are using to communicate (for example, an operating frequency associated with the configuration ID described above), the touch controller may transmit handshake packets as described above to change the stylus device's behavior/operation. For example, the touch controller may transmit a change data packet communication including information corresponding to a new/second operating frequency having a better signal to noise ratio (SNR) to be used for communication with the computing device. This may prompt the stylus device to change its operation and operate using the second operating frequency. The stylus device receives this communication and changes the operating frequency of the stylus device (otherwise referred to a frequency hopping), illustrated as block 1522.”). It would be obvious to a POSITA that a second downstream packet could be transmitted at a different frequency.	
Claim 10 10[pre] The processing system of claim 9, wherein:	<i>See supra</i> 9[pre] – 9[b].	

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 ("Sundara-Rajan") (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 ("Kremin '926")
10 a] the sensor module is further configured to:	<i>See supra</i> 1[a].	
10 b] initiate a prior beacon period by broadcasting a prior beacon; and	Sundara-Rajan discloses that the "stylus device may communicate with more than one computing device and configure the stylus operation so that it can communicate and function with different touch controllers of the different computing devices. A method 1800 of configuring the stylus to the device is described with reference to FIG. 18. The method 1800 is an alternative method of configuring and reconfiguring the stylus to work with a particular computing device than those discussed above. In particular, method 1800 describes the use of a timer T1, that is a timer used to establish a time for matching a frequency between the stylus and device. When the stylus device 102 is in an active mode, illustrated as block 1802, the stylus device may enable a communication module, such as Bluetooth, WiFi, infrared (IR), haptic, etc., illustrated as block 1804, and establish a connection with the host computing device 104, illustrated as block 1806. The stylus device then determines whether the host computing device is a new host computing device, illustrated as block 1808." Sundara-Rajan, at 16:44-17:26. Sundara-Rajan discloses the "prior beacon" when discussing the connection with a new host device. "If the host computing device is a new host computing device, the stylus device may receive a communication or message including data from the host computing device identifying the encoding scheme (i.e., FSK, BPSK or ASK), and update the encoding scheme of the stylus device, illustrated as block 1810, based on the communication from the host computing device. The stylus device may then set timer 1 (T1) (for example, to 1 second), illustrated as block 1812, and	

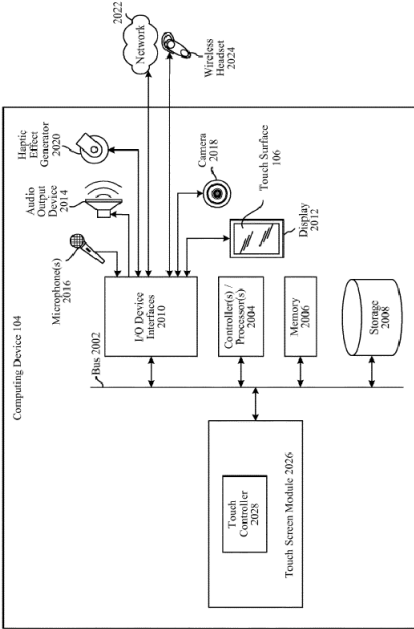
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	determine whether T1 has expired, illustrated as block 1814. If T1 has not expired, the stylus device may continue to poll T1. If T1 has expired, the stylus device may obtain a new output operating frequency from the host computing device, illustrated as block 1816. This may occur when the touch controller of the host computing device detects noise at a current or first operating frequency (which may be a first group of frequencies), and the touch controller may transmit data to change the stylus device's behavior to use a second operating frequency (which may be a second group of frequencies).” <i>Id.</i>	

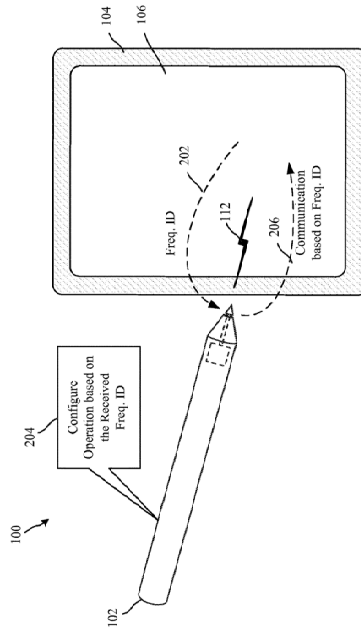
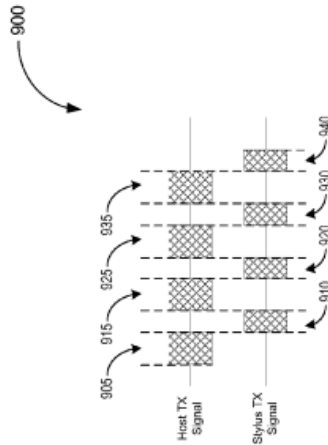


Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
10 c receive, during a timeslot of the prior beacon period, an acknowledgement from the first active pen in response to the prior beacon,	Sundara-Rajan discloses an acknowledgement from an active pen to the sensor module during a timeslot. Specifically, Sundara-Rajan provides an example where “the touch controller transmits a 3 bit Manchester encoded bit pattern in response to sensing the stylus device. The 3 bit Manchester encoding may aid in error correction by enabling majority polling schemes. A preliminary part of the packet consists of a frequency synch (for example, a 15 pulse frequency sync) where the frequency of the pulses is the requested frequency of transmission from the stylus device. For example, when the computing device is requesting/instructing the stylus to operate at a frequency of 85 kHz, the computing device may activate all the electrodes on the touch panel simultaneously, fifteen times at 85 kHz, resulting in number of electronic pulses corresponding to the desired communication frequency. In another embodiment, the computing device may only activate the electrodes in proximity to the stylus device to cause the communication to occur. The frequency synch may be followed by a 2 bit start of frame (0,0), a 3 bit identifier or identification code (also referred to herein as a configuration ID), and a 2 bit end of frame (1,1). This handshake packet may be transmitted by the touch controller about every 10 ms. In the time between transmissions, the touch controller listens for a stylus transmission that matches or acknowledges the requested operation. Once the correct stylus operation is detected, the touch controller may cease transmitting the handshake signals. The configuration ID includes a 3-bit code that represents the encoding scheme used/supported by the touch controller of the computing device to communicate with a stylus device. For example, the configuration ID (1,1,1) may	

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	indicate that the touch controller of the computing device uses frequency shift keying (FSK) scheme for communicating with stylus devices. Similarly, configuration ID (0,0,0) may represent the BPSK communication scheme and configuration ID (0,1,0) may represent the ASK communication scheme." Sundara-Rajan at 10:62-11:30.	
10[d] wherein the first active pen is unpaired during a portion of the prior beacon period,	The active pen in Sundara-Rajan is unpaired prior to connection with a new host device. Sundara-Rajan, at 16:44-17:26; Fig. 18.	
10[e] wherein the upstream packet is generated in response to the acknowledgement, and	The upstream packet is generated in response to the acknowledgement (the stylus may set and pull a timer T1 and "obtain a new output operating frequency" if T1 is expired). Sundara-Rajan, at 16:44-17:26, 4:24-4:28. Sundara-Rajan discloses that "the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency." Sundara-Rajan, at 4:24-4:26. "The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information." <i>Id.</i> at 4:26-4:28.	
10[f] wherein the upstream packet further specifies the first timeslot and the first frequency.	See <i>supra</i> 1[b], 10[b]-[c], [e] (discussing the generation of an upstream packet in Sundara-Rajan). Furthermore, Sundara-Rajan discloses that "the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency." Sundara-Rajan, at 4:24-4:26. "The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information." <i>Id.</i> at 4:26-4:28. A POSITA could	

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103) reasonably expect that such “other information” could include a timeslot and a frequency.	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
Claim 12 (Ind. Claim) 12[pre] A method for operating a processing system of an input device, comprising:	Sundara-Rajan discloses an input device with a processing system. Specifically, in Figure 20, Sundara-Rajan discloses a computing device 104 that has a touchscreen module 2026 and touch screen controller 2028, as well as a display 2012 that may have a touch surface 106 which are understood to be input devices. Sundara-Rajan, at 18:11-63; ’519 Patent at 1:24-27 (“Input devices including proximity sensor devices (also commonly called touchpads or touch sensor devices) are widely used in a variety of electronic systems.”). The computing device 104 also has controller(s)/processor(s) 2004 that may each include a central processing unit (CPU) for processing data and computer-readable instructions. Sundara-Rajan, at 18:11-63. FIG. 1	Kremin’926 discloses an input device with a processing system. Specifically, in Figure 1, Kremin’926 discloses “a block diagram illustrating one embodiment of an electronic system 100 having a processing device 110 for detecting a presence of a touch object 140 and a stylus 130. Electronic system 100 includes processing device 110, capacitive sense array 125, stylus 130, host processor 150, embedded controller 160, and non-capacitive sense elements 170. In the depicted embodiment, the electronic system 100 includes the capacitive sense array 125 coupled to the processing device 110 via bus 122.” Kremin’926, at ¶0019. FIG. 1

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
12[a] generating an upstream packet for a first active pen specifying a pen identification (ID) associated with the first active pen;	FIG. 20  The diagram illustrates the internal architecture of Computing Device 104. At the top, external components including Microphone(s) 2016, Audio Output Device 2014, Haptic Effect Generator 2020, and Camera 2018 are connected to the internal system via Bus 2002. The internal system consists of I/O Device Interface 2010, which is connected to Controller(s)/Processor(s) 2004. This controller is further connected to Memory 2006 and Storage 2008. A Touch Screen Module 2026 is connected to the Controller(s)/Processor(s) 2004. The module includes a Touch Controller 2028 and a Display 2012. The I/O Device Interface 2010 also connects to a Wireless Headset 2024 and a Network 2022.	Kremin’926 discloses that the timing and phase of the TX signal from the host device may be calculated from the encoded data the active pen receives. <i>See</i> Kremin’926, at ¶0061 (“In another embodiment, the any combination of the frequency, timing, and phase of the TX signal 727 may be calculated from data encoded in the synchronization burst 729.”). Kremin’926 also discloses that, “In one embodiment, this synchronization may be performed using one or more of the electrodes of the sense array 201 to transmit a synchronization signal 230 to the active stylus 130. The active stylus 130 may detect (e.g., sense) and demodulate the synchronization signal 230 using receiver 226. The MCU 224 may process the synchronization signal 230 to synchronize the timing of the sensing performed by the processing core 210 and the transmission of the TX signal 227 by the active stylus 130.” <i>Id.</i> at ¶0036. A POSITA would understand that “the synchronize . . . the transmission of the TX signal by the active stylus” could mean that the demodulated

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
12[b] initiating a current beacon period comprising a plurality of timeslots by broadcasting, to a plurality of active pens comprising the first active pen, a current beacon signal comprising the upstream packet;	Sundara-Rajan discloses a frequency ID, which a POSITA would understand to be a plurality of timeslots. In Fig. 2, “the device 104 may transmit a frequency ID, illustrated as 202, to the stylus device 102 via the carrier frequency. In this example, the frequency ID may correspond to a frequency the computing device 104 desires to operate on. The stylus device 102 configures its operation according to the frequency corresponding to the frequency ID, illustrated as 204. The stylus device 102 then communicates with the computing device 104 using the frequency, illustrated as 206. The frequency ID, or other content, may be communicated between the computing device and the stylus device using a Bluetooth message, a WiFi message, an infrared message, electromagnetic (e.g., capacitive, inductive, resonance, radio frequency backscatter, etc.) message, or a haptic message.” Sundara-Rajan, at 4:37-4:50. FIG. 2 	synchronization contains information regarding the TX signal transmission such as a pen ID. Kremin’926 discloses that the active pen “stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940).” Kremin’926, at ¶0067. FIG. 9 

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
12[c] receiving, during a first timeslot, a first downstream packet from a first active pen transceiver over a first frequency;	Sundara-Rajan discloses an active pen with a transceiver. For example, the stylus disclosed in Sundara-Rajan can “function as an electrode(s) to transmit and receive information over the capacitive communication channel.” Sundara-Rajan at 4:55-4:62. Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. A POSITA would understand this to be a downstream packet.	Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin’926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. The stylus TX signal may include button data. <i>See id.</i> ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
12[d] receiving, during a second timeslot, a second downstream packet from a second active pen transceiver over a second frequency; and	It would be obvious to a POSITA that the embodiments disclosed in Sundara-Rajan described in 12[c] could apply to a second active pen. <i>See</i> 1[d]. Sundara-Rajan discloses that if there is noise at the frequency the embodied pen is operating on, the pen will switch to a different frequency. <i>See, e.g.,</i> Sundara-Rajan at 12:24-12:32 (“If the computing device detects noise at a current operating frequency of the stylus device (such as a pre-selected or default frequency) that interferes with stylus-computing device communications, or if the touch controller identifies a better (i.e., higher quality) operating frequency that can be used, the touch controller may start transmitting handshake packets as described above to change the stylus device's behavior to operate at a different or second operating frequency.”); <i>id.</i> at 13:24-13:39 (“If the touch	It would be obvious to a POSITA that the embodiments disclosed in Kremin’926 described in 12[c] could apply to a second active pen. <i>See</i> 1[d].

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	controller detects noise at a current operating frequency that the computing device and stylus device are using to communicate (for example, an operating frequency associated with the configuration ID described above), the touch controller may transmit handshake packets as described above to change the stylus device's behavior/operation. For example, the touch controller may transmit a change data packet communication including information corresponding to a new/second operating frequency having a better signal to noise ratio (SNR) to be used for communication with the computing device. This may prompt the stylus device to change its operation and operate using the second operating frequency. The stylus device receives this communication and changes the operating frequency of the stylus device (otherwise referred to a frequency hopping), illustrated as block 1522.”). It would be obvious to a POSITA that a second downstream pack could be transmitted at a different frequency.	
12[e] determining an attribute of the first active pen comprising the first active pen transceiver from at least the first downstream packet.	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. <i>See also supra</i> regarding 1[c].	Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin’926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. The stylus TX signal may include button data. <i>See id.</i> ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
		TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
Claim 13		
13[pre] The method of claim 12,	<i>See supra</i> 12[pre] – 12[e].	<i>See supra</i> 12[pre] – 12[e].
13[a] wherein the first active pen further comprises the second active pen transceiver, and	Sundara-Rajan discloses an active pen with a transceiver. For example, the stylus disclosed in Sundara-Rajan can “function as an electrode(s) to transmit and receive information over the capacitive communication channel.” Sundara-Rajan at 4:55-4:62. It would be obvious to a POSITA that these embodiments disclosed in Sundara-Rajan could apply to a second active pen.	Kremin’926 discloses a stylus that receives a host TX signal and then transmits a stylus TX signal, and thus a POSITA would understand that Kremin’926 discloses a stylus with a transceiver. Kremin’926, at ¶0067 (“In one embodiment, the stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940). In one embodiment, the stylus transmits a stylus TX signal matching the phase and/or frequency of the host TX signal for a pre-determined time after the end of the host TX signal burst is detected.”). It would be obvious to a POSITA that these embodiments disclosed in Kremin’926 could apply to a second active pen.
13[b] wherein the attribute of the first active pen is further determined from the second downstream packet.	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with	Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin’926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information,

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. A POSITA would understand that, from this information transmitted from the second downstream packet from the second active pen, the processing system would determine an attribute of the first active pen, in that it would determine that the first active pen is different than the second active pen.	the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. A POSITA would understand that, from this information transmitted from the second downstream packet from the second active pen, the processing system would determine an attribute of the first active pen, in that it would determine that the first active pen is different than the second active pen.
Claim 14		
14[pre] The method of claim 12, further comprising:	<i>See supra</i> 12[pre] – 12[e].	<i>See supra</i> 12[pre] – 12[e].
14[a] determining an attribute of a second active pen comprising the second active pen transceiver from the second downstream packet.	It would be obvious to a POSITA that the embodiments disclosed in Sundara-Rajan described in 2[a] and 13[b] could apply to a second active pen because Sundara-Rajan states “the term ‘a’ or ‘one’ may include one or more items.” Sundara-Rajan, at 20:8-20:9. Therefore, a POSITA would interpret the features of the “stylus device” in Sundara-Rajan to apply to one or more pens. Furthermore, a POSITA would understand that Sundara-Rajan teaches the ability to handle multiple pens based on the description of Fig. 20 which specifies an I/O Device Interfaces 2010 that communicates with a plurality of devices. The I/O Device Interfaces are described as allowing “[a] variety of components [to] be connected.” Sundara-Rajan, at 18:51-18:53.	It would be obvious to a POSITA that the embodiments disclosed in Kremin’926 described in 2[a] and 13[b] could apply to a second active pen. Kremin’926 expressly discloses that the processing device of the touchscreen “is configured to detect a presence” of both an active stylus and a touch object individually or concurrently. Kremin’926, ¶¶0020, 0017 (disclosing using electrodes to track the position of multiple touch objects). Furthermore, Kremin’926 explicitly mentions two types of styluses: “In contract to passive styluses, an active stylus 130 provides the transmit signal 227 (TX signal).” <i>Id.</i> ¶0041. Thus, a POSITA would understand that a second pen is taught by the prior art. A POSITA would also understand that Kremin’926 teaches the possibility of handling multiple pens by disclosing “the interconnection between circuit components or blocks may be shown as buses [for bidirectional communication] or as single

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
		signal lines. Each of the buses may alternatively be one or more single signal lines and each of the single signal lines may alternatively be buses.” <i>Id.</i> ¶0075. A POSITA would have been motivated to use Kremin ’926’s disclosure of multiple touch objects with the disclosure of Sundara-Rajan. <i>See</i> limitation 1[d]. Sundara-Rajan is directed to an active stylus that is capable with communicating with “a multitude of touch controllers” but provides minimal detail on how to use more than one active stylus simultaneously. Sundara-Rajan, at 3:2-3:9. A POSITA would thus look to Kremin ’926’s specific disclosure of simultaneous use of multiple touch objects (such as multiple active styluses) with a single touchscreen.
Claim 17		
17[pre] The method of claim 12,	<i>See supra</i> 12[pre] – 12[e].	<i>See supra</i> 12[pre] – 12[e].
17[a] wherein the attribute of the first active pen is at least one selected from a group consisting of a force measurement at a tip of the first active pen and a button status of a button on the first active pen.	Sundara-Rajan discloses that the claimed pen may include “a force/pressure sensor 408 (for example, an optical pressure sensor, a capacitive pressure sensor, a piezoelectric sensor, a piezoelectric resistive sensor, or other sensor capable of measuring force/pressure).” Sundara-Rajan, at 5:15-5:20. Sundara-Rajan discloses that force/pressure detected in the pen can be transmitted to the computing device. <i>See id.</i> at 5:33-5:45 (“The metallic shaft 406 coupled to the pressure sensor 408 provides a mechanical path from the tip to the pressure sensor 408 to allow the pressure sensor 408 to measure the pressure at the tip 108. The metallic shaft 406 also provides a transmission path for carrying a signal (such as, an electric field or frequency of operation to be generated by the stylus device 102) from a microcontroller or printed	Kremin ’926 discloses an active pen with a button. <i>See</i> Kremin ’926, at ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”). Kremin ’926 discloses that this force data and button data can be transmitted to the computing device. <i>See id.</i> at ¶0041 (“In contrast to passive styluses, an active stylus 130 provides the transmit signal 227 (TX signal). This signal 227 may be provided to the active stylus 130 by the processing core 210 as part of the synchronization. The active stylus 130

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103) circuit board (PCB) of the stylus device 102 to the tip 108. This signal allows the stylus device 102 to communicate with the computing device 104, and allows the computing device 104 to determine a location (X-Y coordinates) of the stylus device 104 in relation to the touch screen of the computing device 104.”).	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”) capacitively couples the stylus TX signal 227 to the sense array 201.”).
Claim 19		
19[pre] The method of claim 12, further comprising:	<i>See supra</i> 12[pre] – 12[e].	<i>See supra</i> 12[pre] – 12[e].
19[a] initiating, before initiating the current beacon period, a prior beacon period by broadcasting a prior beacon signal;	Sundara-Rajan discloses that the “stylus device may communicate with more than one computing device and configure the stylus operation so that it can communicate and function with different touch controllers of the different computing devices. A method 1800 of configuring the stylus to the device is described with reference to FIG. 18. The method 1800 is an alternative method of configuring and reconfiguring the stylus to work with a particular computing device than those discussed above. In particular, method 1800 describes the use of a timer T1, that is a timer used to establish a time for matching a frequency between the stylus and device. When the stylus device 102 is in an active mode, illustrated as block 1802, the stylus device may enable a communication module, such as Bluetooth, WiFi, infrared (IR), haptic, etc., illustrated as block 1804, and establish a connection with the host computing device 104, illustrated as block 1806. The stylus device then determines whether the host computing device is a new host computing device, illustrated as block 1808.” Sundara-Rajan, at 16:44-17:26.	Kremin’926 discloses that the ITO panel or touch screen of the host device may send a synchronization signal to the active pen, which may be different from the frequency of the host TX signal. This discloses a prior beacon from the first input device. <i>See</i> Kremin’926, ¶0056 (“The method 500 begins with the host device providing a plurality of electrodes in a capacitive sense array (block 505). In one embodiment, the plurality of electrodes may be part of an ITO panel or a touch screen. At block 510, a synchronization signal is transmitted to a stylus using the plurality of electrodes. Any combination or sequence of the plurality of electrodes may be used to transmit the synchronization signal, as discussed above in conjunction with FIG. 2. In one embodiment, the frequency of the synchronization signal may be different from the frequency of a host TX signal, which may also be transmitted using the plurality of electrodes. In another embodiment, the frequency of the synchronization signal may be higher than the frequency of the host TX signal. In a further embodiment, the frequency of the synchronization

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103) Sundara-Rajan discloses the “prior beacon” when discussing the connection with a new host device. “If the host computing device is a new host computing device, the stylus device may receive a communication or message including data from the host computing device identifying the encoding scheme (i.e., FSK, BPSK or ASK), and update the encoding scheme of the stylus device, illustrated as block 1810, based on the communication from the host computing device. The stylus device may then set timer 1 (T1) (for example, to 1 second), illustrated as block 1812, and determine whether T1 has expired, illustrated as block 1814. If T1 has not expired, the stylus device may continue to poll T1. If T1 has expired, the stylus device may obtain a new output operating frequency from the host computing device, illustrated as block 1816. This may occur when the touch controller of the host computing device detects noise at a current or first operating frequency (which may be a first group of frequencies), and the touch controller may transmit data to change the stylus device's behavior to use a second operating frequency (which may be a second group of frequencies).” <i>Id.</i>	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”) signal may be lower than the frequency of the host TX signal.”).
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Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	FIG. 18 <pre> graph TD 1802[Active Mode] --> 1804[Enable Communication Module] 1804 --> 1806[Establish Connection with Host] 1806 --> 1808{New Host Found?} 1808 -- No --> 1806 1808 -- Yes --> 1810[Update Payload Encoding Scheme] 1810 --> 1812[Set T1 for 1s] 1812 --> 1814{Has T1 Expired?} 1814 -- No --> 1812 1814 -- Yes --> 1816[Obtain New Output Freq. from Host] </pre>	
19[b] receiving, during a timeslot of the prior beacon period, an acknowledgement from the first active pen in response to the prior beacon,	Sundara-Rajan discloses an acknowledgement from an active pen to the sensor module during a timeslot. Specifically, Sundara-Rajan provides an example where “the touch controller transmits a 3 bit Manchester encoded bit pattern in response to sensing the stylus device. The 3 bit Manchester encoding may aid in error correction by enabling majority polling schemes. A preliminary part of the packet consists of a frequency synch (for example, a 15 pulse frequency sync) where the frequency of the pulses is the requested frequency of transmission from the stylus device. For example, when the computing device is	Kremin’926 discloses an acknowledgement from an active pen to the sensor module during a timeslot. Specifically, Kremin’926 discloses an embodiment where “embodiment of a stylus 850 configured to synchronize to a host 805. The host 805 includes an ITO panel 810 and a receiver 815. In one embodiment, the ITO panel 810 may transmit a synchronization burst using one or more electrodes (e.g., electrodes) of the ITO panel 810. As discussed above, the synchronization burst may include other data. The ITO panel 810 may also receive a TX signal from the stylus 850 (via capacitive coupling with the stylus 850) and may provide this

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	requesting/instructing the stylus to operate at a frequency of 85 kHz, the computing device may activate all the electrodes on the touch panel simultaneously, fifteen times at 85 kHz, resulting in number of electronic pulses corresponding to the desired communication frequency. In another embodiment, the computing device may only activate the electrodes in proximity to the stylus device to cause the communication to occur. The frequency synch may be followed by a 2 bit start of frame (0,0), a 3 bit identifier or identification code (also referred to herein as a configuration ID), and a 2 bit end of frame (1,1). This handshake packet may be transmitted by the touch controller about every 10 ms. In the time between transmissions, the touch controller listens for a stylus transmission that matches or acknowledges the requested operation. Once the correct stylus operation is detected, the touch controller may cease transmitting the handshake signals. The configuration ID includes a 3-bit code that represents the encoding scheme used/supported by the touch controller of the computing device to communicate with a stylus device. For example, the configuration ID (1,1,1) may indicate that the touch controller of the computing device uses frequency shift keying (FSK) scheme for communicating with stylus devices. Similarly, configuration ID (0,0,0) may represent the BPSK communication scheme and configuration ID (0,1,0) may represent the ASK communication scheme.” Sundara-Rajan at 10:62-11:30.	TX signal to the receiver 815. The receiver 815 may filter, amplify, or otherwise process the TX signal and may provide the processed TX signal to a processing device in order to determine a location of contact point between the stylus 850 and the ITO panel 810. The stylus 850 includes a stylus tip 851, a TX filter 855, an amplifier/AGC circuit 860, a TX clock qualifier 865, a phase-locked loop (PLL) circuit 870, a carrier detector 875, and a TX driver 880. In one embodiment, the functions of some of the circuits shown in FIG. 8 may be performed by an MCU, rather than a dedicated circuit or component. The stylus tip 851 may receive signals (including a synchronization burst) transmitted by one or more electrodes of the ITO panel 810. The synchronization burst may be provided to the TX filter 855 which may initially filter the signal received by the stylus 850. The filtered signal is provided to the amplifier/AC circuit 860 which amplifies the filtered signal and provides an automatic gain control loop to maintain a constant synchronization signal amplitude over a wide-input-signal voltage range. The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851. The amplified signal is also provided to the TX clock qualifier 865. The TX clock qualifier 865 will filter out the synchronization burst from the amplified signal and provides the synchronization burst to the PLL circuit 870. The PLL circuit 870 may be used to synchronize the operation of the stylus 850 to the timing of the synchronization burst. As discussed above, the PLL circuit 870 may synchronize the

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
19[c] wherein the first active pen is unpaired during at least a portion of the prior beacon period,		operation of the stylus 850 to the host 805 on a cycle by cycle basis. The PLL 870 generates a stylus TX signal (which is synchronized to the synchronization burst) to the TX driver 880 which provides (e.g., drives) the stylus TX signal to the stylus tip 851. In one embodiment, the PLL 870 may be a digital PLL implemented at least partially in firmware on an MCU.” Kremin’926, at ¶0062-64. Because the TX signal may include “other data,” a POSITA would also understand could include an acknowledgment. The diagram illustrates the system architecture. On the left, a dashed box labeled 'HOST 805' contains an 'ITD' block and a 'TX/RX' block. The 'TX/RX' block is connected to a 'Receiver 815'. On the right, a dashed box labeled 'STYLUS 850' contains several blocks: a 'TX Driver 880' connected to a 'Carrier Detector 825', which is connected to a 'PLL Circuit 870'. The 'PLL Circuit 870' is connected to a 'TX Clock Oscillator 885'. The 'TX Driver 880' is also connected to a 'TX Filter 855', which is connected to the 'Stylus Tip 851'. A bidirectional arrow connects the 'TX/RX' block of the host to the 'Receiver 815' of the stylus. FIG. 8
19[c] wherein the first active pen is unpaired during at least a portion of the prior beacon period,	<i>See supra</i> 10[d]. The active pen in Sundara-Rajan is unpaired prior to connection with a new host device. Sundara-Rajan, at 16:44-17:26; Fig. 18.	They stylus disclosed in Kremin’926 is unpaired during at least a portion of the prior beacon period, as discussed in 19[a]-[b] and shown in Figures 9 and 10:

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
19[d] wherein the upstream packet is generated in response to the acknowledgment, and	<i>See supra</i> 10[e]. The upstream packet is generated in response to the acknowledgment (the stylus may set and pull a timer T1 and “obtain a new output operating frequency” if T1 is expired). Sundara-Rajan, at 16:44-17:26; 4:24-4:28.	900 Host TX Signal Stylus TX Signal 905 915 925 935 910 920 930 940 FIG. 9 1000 Host TX Host RX Stylus TX 1005 1010 1015 1020 1025 1030 1035 1040 FIG. 10 Kremin ’926 discloses the generation of an upstream packet in response to the acknowledgment. Specifically, “FIG. 10 is a timing diagram 1000 illustrating another embodiment of a synchronization between a stylus and a host. The timing diagram 100 includes a host TX timeline, a stylus TX timeline, and a host RX timeline.

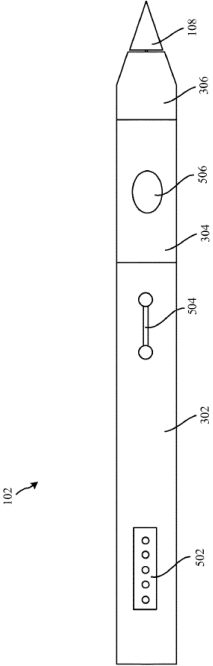
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
		As shown in FIG. 10, the host transmits a synchronization burst at time interval 1005. The stylus may detect the synchronization burst transmitted at time interval 1005 and synchronize the operation of the stylus to the host using the synchronization burst (e.g., using the PLL described above to synchronize with the synchronization burst). The stylus may also transmit a stylus TX signal after the synchronization burst ends at time interval 1020. The host may listen (e.g., detect) the stylus TX signal at time interval 1010, to confirm that a stylus is present on the capacitive sense array. After confirming that the stylus is present on the capacitive sense array, the host will listen (e.g., detect) on one or more of the rows and columns of electrodes in the capacitive sense array for the stylus TX signal at time interval 1015. In one embodiment, the host may transmit a host TX signal on a first set of electrodes at time interval 1025 and may receive or detect the host TX signal on a second set of electrodes at time interval 1030 (e.g., may perform touch object detection). At time interval 1035, the host TX timeline, a stylus TX timeline, and a host RX timeline may restart such the host again transmits a synchronization burst at time interval 1035 and the host again listens (e.g., scans the RX electrodes) for a stylus TX signal at time interval 1040.” Kremin’926, at ¶¶0068-0070.

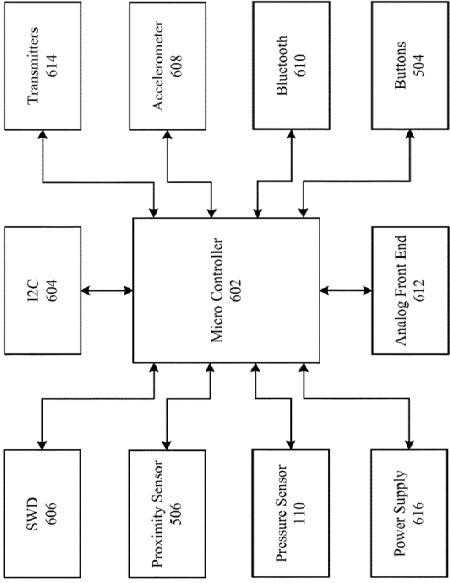
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
		FIG. 10 Additionally, Kremin’926 discloses its Figure 11. “FIG. 11 is a flow chart of a further embodiment of a method 1100 of synchronizing a stylus to a host. The method 1100 may be performed by a host that comprises hardware (e.g., circuitry, electrodes, switches, dedicated logic, programmable logic, microcode), software (e.g., instructions run on a processing device to perform hardware simulation), or a combination thereof. In one embodiment, method 1100 may be performed by processing device 702 as shown in FIG. 7. The method 1100 begins with the host device providing a plurality of electrodes in a capacitive sense array (block 1105). In one embodiment, the plurality of electrodes may be part of an ITO panel or a touch screen. At block 1110, a synchronization burst is transmitted to a stylus at a first time interval, using the plurality of electrodes. Any combination or sequence of the plurality of electrodes may be used to transmit the synchronization signal, as discussed above in conjunction with FIG. 2. In one embodiment, the frequency of the synchronization burst may be the same as the frequency of a TX signal which may be transmitted by the host device. The

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
19[e] wherein the upstream packet further specifies	<i>See supra</i> 10[e]. The upstream packet is generated in response to the acknowledgment (the stylus may set and pull	host device listens (e.g., scans or detects) for a stylus TX signal at a second time interval using the plurality of electrodes at block 1115 (e.g., touch object detection). At block 1120, the host device transmits a host TX signal using the rows of electrodes and detects the host TX signal using the columns of electrodes at a third time interval. In one embodiment, the host device may transmit the host TX signal using the columns of electrodes and may detect the host TX signal using the rows of electrodes.” <i>Id.</i> at ¶¶0071-0072. <pre> graph TD START([START]) --> 1105[PROVIDE PLURALITY OF ELECTRODES] 1105 --> 1110[TRANSMIT SYNCHRONIZATION BURST AT FIRST TIME INTERVAL USING PLURALITY OF ELECTRODES] 1110 --> 1115[LISTEN FOR TX SIGNAL FROM STYLUS AT SECOND TIME INTERVAL USING PLURALITY OF ELECTRODES] 1115 --> 1120[TRANSMIT HOST TX SIGNAL ON ROWS OF ELECTRODES AND DETECT HOST TX SIGNAL ON COLUMNS OF ELECTRODES AT THIRD TIME INTERVAL] 1120 --> END([END]) </pre> FIG. 11
19[e] wherein the upstream packet further specifies	<i>See supra</i> 10[e]. The upstream packet is generated in response to the acknowledgment (the stylus may set and pull	Claims 9-10 of Kremin ’926 disclose that the stylus is synchronized based on a frequency and a phase (<i>i.e.</i>, timeslot) of the host device’s synchronization signal.

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the first timeslot and the first frequency.	a timer TI and “obtain a new output operating frequency” if TI is expired). Sundara-Rajan, at 16:44-17:26; 4:24-4:28.	Kremin’926 also discloses that “the stylus may detect, listen or scan for the host TX signal and may synchronize its operation to the time intervals (e.g., gaps) between the transmissions of the host TX signal. The stylus may transmit a stylus TX signal in the gaps between the transmission of the host TX signal.” Kremin’926, at ¶0018. <i>See also supra</i> 10[e].
Claim 20 (Ind. Claim)		
20[pre] An active pen, comprising:	Sundara-Rajan discloses an active pen. <i>See, e.g.</i>, Sundara-Rajan at Fig. 1:	Kremin’926 discloses an active pen. <i>See, e.g.</i>, Kremin’926, at Fig. 1:
	Fig. 1 illustrates a stylus device 102 and a computing device 104 having a touch screen 106. The stylus device 102 is an active capacitive type of stylus including an active tip 108 and a pressure sensor 110. <i>See also id.</i> at Figs. 2-5; <i>id.</i> at 3:33-35 (“The embodiments described herein provide an active capacitive stylus that	FIG. 1 <i>See also</i> Kremin’926, at ¶0020 (“In short, the processing device 110 is configured to detect a presence of the active stylus 130 on the capacitive sense array 125, as well as a presence of the touch object 140. The processing device 110 may detect and track the active stylus 130 and the touch object 140 individually on the capacitive sense array 125.”).

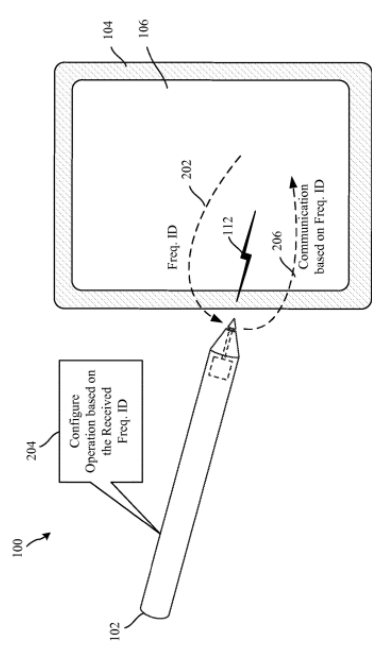
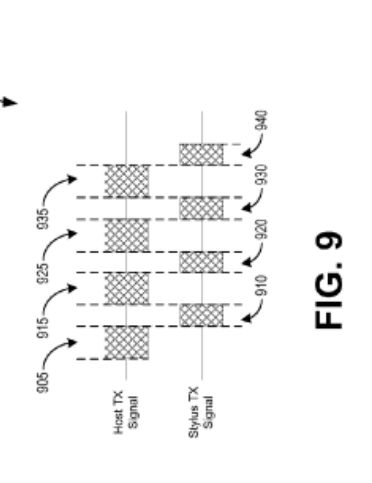
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 ("Sundara-Rajan") (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 ("Kremin'926")
	enables the computing device to communicate to the active stylus").	
20[a] an identification (ID) register storing a pen identification (ID);	Sundara-Rajan discloses an active pen having an identification (ID) register storing a pen identification (ID). For example, the stylus device disclosed in Sundara-Rajan contains a microcontroller (any type of microcontroller). Sundara-Rajan at 6:19-6:42. "The microcontroller 602 may include memory sufficient to store the encoding schemes" <i>Id.</i> at 6:36-6:38. Sundara-Rajan also discloses that the stylus receives a "configuration ID" from a computing device that may include information. <i>Id.</i> at 4:24-4:28 ("For example, the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency. The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information."). "In response to the configuration ID being received, the stylus device configures the stylus device to operate using the encoding scheme or operation mode corresponding to the configuration ID of the computing device (e.g., FSK, BPSK or ASK), illustrated as block 1516, and shifts to active mode. Configuration information may be stored in a memory of the stylus device and retrieved based on the received configuration ID." <i>Id.</i> at 13:5-13:23. A POSITA would understand that the disclosed stylus contains an identification (ID) register capable of storing data such as a pen identification (ID) or configuration ID.	
20[b] a button; and	Sundara-Rajan discloses an active pen with a button. See Sundara-Rajan at 5:46-5:49 ("Referring to FIG. 5, in an	Kremin'926 discloses an active pen with a button. See Kremin'926, at ¶0063 ("The amplified signal is provided to

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	embodiment, the stylus device 102 may also include one or more connectors 502, one or more switches or buttons 504, and one or more proximity sensors 506.”) FIG. 5 	the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
20[c] a transceiver configured to:	Sundara-Rajan discloses an active pen with a transceiver. For example, the stylus disclosed in Sundara-Rajan can “function as an electrode(s) to transmit and receive information over the capacitive communication channel.” Sundara-Rajan at 4:55-4:62.	Kremin’926 discloses a stylus that receives a host TX signal and then transmits a stylus TX signal, and thus a POSITA would understand that Kremin’926 discloses a stylus with a transceiver. Kremin’926, at ¶0067 (“In one embodiment, the stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940). In one embodiment, the stylus transmits a stylus TX signal matching the phase and/or frequency of the host TX signal for a pre-determined time after the end of the host TX signal burst is detected.”).

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	Additionally, Sundara-Rajan discloses a stylus capable of two-way communication. <i>See id.</i> at 6:19-6:27 (“A functional block diagram of example components of the stylus device 102 is described with reference to FIG. 6. As illustrated in FIG. 6, the stylus device 102 may include one or more of a microcontroller 602, one or more I2C (inter-integrated circuit) communication ports 604, button(s) 504, one or more serial wire debug (SWD) ports 606, accelerometer 608, Bluetooth 610, analog front end (AFE) 612, one or more transmitters 614, proximity sensor(s) 506, pressure sensor 110, and power supply module 616.”). FIG. 6  <pre> graph TD SWD[SWD 606] <--> MC[Micro Controller 602] PS[Proximity Sensor 506] <--> MC PRes[Pressure Sensor 110] <--> MC PSup[Power Supply 616] <--> MC I2C[I2C 604] <--> MC Trans[Transmitters 614] <--> MC Acc[Accelerometer 608] <--> MC BT[Bluetooth 610] <--> MC Buttons[Buttons 504] <--> MC AFE[Analog Front End 612] <--> MC </pre>	
20[d] receive, from a first input device, a current beacon signal comprising an	Sundara-Rajan discloses an active pen with a transceiver configured to receive, from a first input device, a current beacon signal comprising an upstream packet specifying the pen ID, a timeslot, and a frequency.	Kremin’926 discloses that the timing and phase of the TX signal from the host device may be calculated from the encoded data the active pen receives. <i>See</i> Kremin’926, at ¶0061 (“In another embodiment, the any combination of the frequency, timing, and phase of the TX signal 727 may be

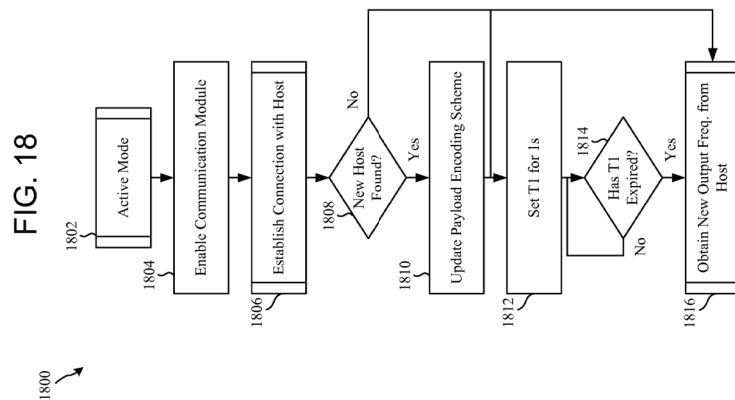
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
upstream packet specifying the pen ID, a timeslot, and a frequency,	Sundara-Rajan discloses that “the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency.” Sundara-Rajan, at 4:24-4:26. “The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information.” <i>Id.</i> at 4:26-4:28. A POSITA could reasonably expect that such “other information” could include a pen ID, a timeslot, and a frequency. Additionally, Sundara-Rajan also discloses that the host device “may transmit a frequency ID, illustrated as 202, to the stylus device 102 via the carrier frequency.” <i>Id.</i> at 4:37-4:38. “[T]he frequency ID may correspond to a frequency the computing device 104 desires to operate on.” <i>Id.</i> at 4:39-4:41. FIG. 2 Additionally, Sundara-Rajan discloses the touch controller of the host device transmitting “a handshake packet to the stylus device using the capacitive link.” <i>Id.</i> at 10:34-10:36. “As part of the handshake, or in a different communication, using the electrodes, the touch controller may transmit	calculated from data encoded in the synchronization burst 729.”). Kremin ’926 also discloses that, “In one embodiment, this synchronization may be performed using one or more of the electrodes of the sense array 201 to transmit a synchronization signal 230 to the active stylus 130. The active stylus 130 may detect (e.g., sense) and demodulate the synchronization signal 230 using receiver 226. The MCU 224 may process the synchronization signal 230 to synchronize the timing of the sensing performed by the processing core 210 and the transmission of the TX signal 227 by the active stylus 130.” <i>Id.</i> at ¶0036. A POSITA would understand that “the synchronize . . . the transmission of the TX signal by the active stylus” could mean that the demodulated synchronization contains information regarding the TX signal transmission such as timing and frequency.

Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
20[e] wherein the current beacon signal initiates a current beacon period comprising a plurality of timeslots; and	configuration information to the stylus device 102 to request the stylus device 104 to operate in a certain mode. The stylus may use this configuration information to configure (1409) its operation to match the computing device 104. The configuration information may include an identifier or identification code of the computing device 104, an identifier or identification code corresponding to an encoding scheme and/or an operating frequency stored on the stylus device 102, or other information for communicating a mode of operation to the stylus device 102.” <i>Id.</i> at 10:50-10:61. Sundara-Rajan also discloses a host device communicating the proper frequency to a stylus (or active pen). <i>See, e.g., id.</i> at 10:33-11:10, 13:24-13:39.	
20[e] wherein the current beacon signal initiates a current beacon period comprising a plurality of timeslots; and	Sundara-Rajan discloses a frequency ID, which a POSITA would understand to be a plurality of timeslots. Specifically, in Fig. 2, “the device 104 may transmit a frequency ID, illustrated as 202, to the stylus device 102 via the carrier frequency. In this example, the frequency ID may correspond to a frequency the computing device 104 desires to operate on. The stylus device 102 configures its operation according to the frequency corresponding to the frequency ID, illustrated as 204. The stylus device 102 then communicates with the computing device 104 using the frequency, illustrated as 206. The frequency ID, or other content, may be communicated between the computing device and the stylus device using a Bluetooth message, a WiFi message, an infrared message, electromagnetic (e.g., capacitive, inductive, resonance, radio frequency backscatter, etc.) message, or a haptic message.” Sundara-Rajan, at 4:37-4:50.	Kremin’926 discloses that the active pen “stylus may listen or detect the host TX signal to determine the time intervals 905, 915, 925, and 935 of the host TX signal. After determining the time intervals 905, 915, 925, and 935 of the host TX signal, the stylus may synchronize its operation to the time intervals 905, 915, 925, and 935 of the host TX signal, such that the stylus transmits the stylus TX signal only within the gaps between time intervals 905, 915, 925, and 935 of the host TX signal (e.g., only within time intervals 910, 920, 930, and 940).” Kremin’926, at ¶0067.

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20[f] transmit, to the first input device and during the timeslot specified in the upstream packet, a downstream packet comprising a status of the button using the frequency specified in the upstream packet.	 FIG. 2	 FIG. 9
20[pre] The active pen of claim 20, wherein the	Sundara-Rajan discloses that the stylus “may create an output sequence to be transmitted to the computing device based on the encoding scheme (i.e., FSK, BPSK or ASK), output pressure levels of the pressure sensor, buttons, and other components of the stylus device, illustrated as block 1906. The output sequence may be the data the stylus device is to transmit to the computing device encoded with the appropriate encoding scheme (i.e. the output bit patterns the stylus device is to transmit to the computing device).” Sundara-Rajan, at 17:36-17:44. <i>See also supra</i> regarding 20[c].	Kremin’926 discloses a synchronization signal from the ITO panel (the upstream packet) which is provided to the stylus, which then demodulates the signal to determine when the stylus should transmit a TX signal (the downstream packet). <i>See</i> Kremin’926, at ¶0050. The synchronization burst (i.e., the beacon signal) from the processing device (i.e., host) encodes timing and frequency information. Based on that information, the stylus transmits a TX signal (i.e., a downstream packet). <i>Id.</i> ¶0061. The stylus TX signal may include button data. <i>See id.</i> ¶0063 (“The amplified signal is provided to the carrier detector 875 which may process the signal to determine if the amplified signal includes additional data (e.g., force data, button data, etc.). The additional data may be provided to the TX driver 880 which may use the additional data when providing the stylus TX signal to the stylus tip 851.”).
Claim 21	<i>See supra</i> regarding 20[pre] and 20[c].	<i>See supra</i> regarding 20[pre] and 20[c].

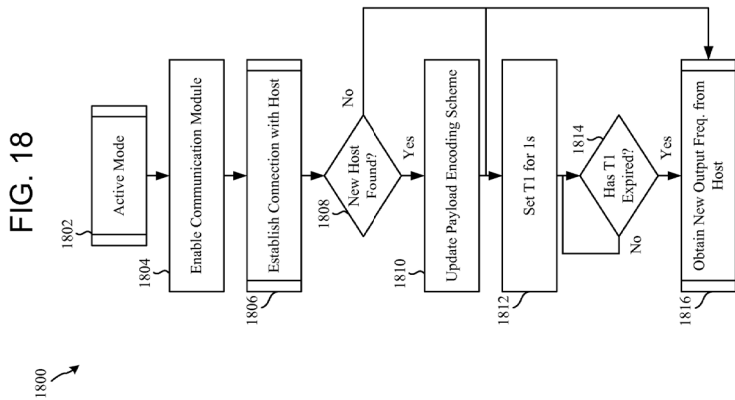
Claim Elements U.S. Patent No. 9,977,519 transceiver is further configured to:	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin ’926”)
21[a] receive, before receiving the current beacon signal, a prior beacon from the first input device,	Sundara-Rajan discloses that the “stylus device may communicate with more than one computing device and configure the stylus operation so that it can communicate and function with different touch controllers of the different computing devices. A method 1800 of configuring the stylus to the device is described with reference to FIG. 18. The method 1800 is an alternative method of configuring and reconfiguring the stylus to work with a particular computing device than those discussed above. In particular, method 1800 describes the use of a timer T1, that is a timer used to establish a time for matching a frequency between the stylus and device. When the stylus device 102 is in an active mode, illustrated as block 1802, the stylus device may enable a communication module, such as Bluetooth, WiFi, infrared (IR), haptic, etc., illustrated as block 1804, and establish a connection with the host computing device 104, illustrated as block 1806. The stylus device then determines whether the host computing device is a new host computing device, illustrated as block 1808.” Sundara-Rajan, at 16:44-17:26. Sundara-Rajan discloses the “prior beacon” when discussing the connection with a new host device. “If the host computing device is a new host computing device, the stylus device may receive a communication or message including data from the host computing device identifying the encoding scheme (i.e., FSK, BPSK or ASK), and update the encoding scheme of the stylus device, illustrated as block 1810, based on the communication from the host computing device. The stylus device may then set timer 1 (T1) (for example, to 1 second), illustrated as block 1812, and	Kremin ’926 discloses that the ITO panel or touch screen of the host device may send a synchronization signal to the active pen, which may be different from the frequency of the host TX signal. This discloses a prior beacon from the first input device. <i>See</i> Kremin ’926, ¶0056 (“The method 500 begins with the host device providing a plurality of electrodes in a capacitive sense array (block 505). In one embodiment, the plurality of electrodes may be part of an ITO panel or a touch screen. At block 510, a synchronization signal is transmitted to a stylus using the plurality of electrodes. Any combination or sequence of the plurality of electrodes may be used to transmit the synchronization signal, as discussed above in conjunction with FIG. 2. In one embodiment, the frequency of the synchronization signal may be different from the frequency of a host TX signal, which may also be transmitted using the plurality of electrodes. In another embodiment, the frequency of the synchronization signal may be higher than the frequency of the host TX signal. In a further embodiment, the frequency of the synchronization signal may be lower than the frequency of the host TX signal.”).

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	determine whether T1 has expired, illustrated as block 1814. If T1 has not expired, the stylus device may continue to poll T1. If T1 has expired, the stylus device may obtain a new output operating frequency from the host computing device, illustrated as block 1816. This may occur when the touch controller of the host computing device detects noise at a current or first operating frequency (which may be a first group of frequencies), and the touch controller may transmit data to change the stylus device's behavior to use a second operating frequency (which may be a second group of frequencies).” <i>Id.</i>	



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21[b] wherein the prior beacon signal initiates a prior beacon period, and	Sundara-Rajan discloses that the “stylus device may communicate with more than one computing device and configure the stylus operation so that it can communicate and function with different touch controllers of the different computing devices. A method 1800 of configuring the stylus to the device is described with reference to FIG. 18. The method 1800 is an alternative method of configuring and reconfiguring the stylus to work with a particular computing device than those discussed above. In particular, method 1800 describes the use of a timer T1, that is a timer used to establish a time for matching a frequency between the stylus and device. When the stylus device 102 is in an active mode, illustrated as block 1802, the stylus device may enable a communication module, such as Bluetooth, WiFi, infrared (IR), haptic, etc., illustrated as block 1804, and establish a connection with the host computing device 104, illustrated as block 1806. The stylus device then determines whether the host computing device is a new host computing device, illustrated as block 1808.” Sundara-Rajan, at 16:44-17:26. Sundara-Rajan discloses the “prior beacon” when discussing the connection with a new host device. “If the host computing device is a new host computing device, the stylus device may receive a communication or message including data from the host computing device identifying the encoding scheme (i.e., FSK, BPSK or ASK), and update the encoding scheme of the stylus device, illustrated as block 1810, based on the communication from the host computing device. The stylus device may then set timer 1 (T1) (for example, to 1 second), illustrated as block 1812, and determine whether T1 has expired, illustrated as block 1814. If T1 has not expired, the stylus device may continue to poll T1. If T1 has expired, the stylus device may obtain a new	Kremin’926 discloses that the ITO panel or touch screen of the host device may send a synchronization signal to the active pen, which may be different from the frequency of the host TX signal. This discloses a prior beacon from the first input device. <i>See</i> Kremin’926, ¶0056 (“The method 500 begins with the host device providing a plurality of electrodes in a capacitive sense array (block 505). In one embodiment, the plurality of electrodes may be part of an ITO panel or a touch screen. At block 510, a synchronization signal is transmitted to a stylus using the plurality of electrodes. Any combination or sequence of the plurality of electrodes may be used to transmit the synchronization signal, as discussed above in conjunction with FIG. 2. In one embodiment, the frequency of the synchronization signal may be different from the frequency of a host TX signal, which may also be transmitted using the plurality of electrodes. In another embodiment, the frequency of the synchronization signal may be higher than the frequency of the host TX signal. In a further embodiment, the frequency of the synchronization signal may be lower than the frequency of the host TX signal.”).

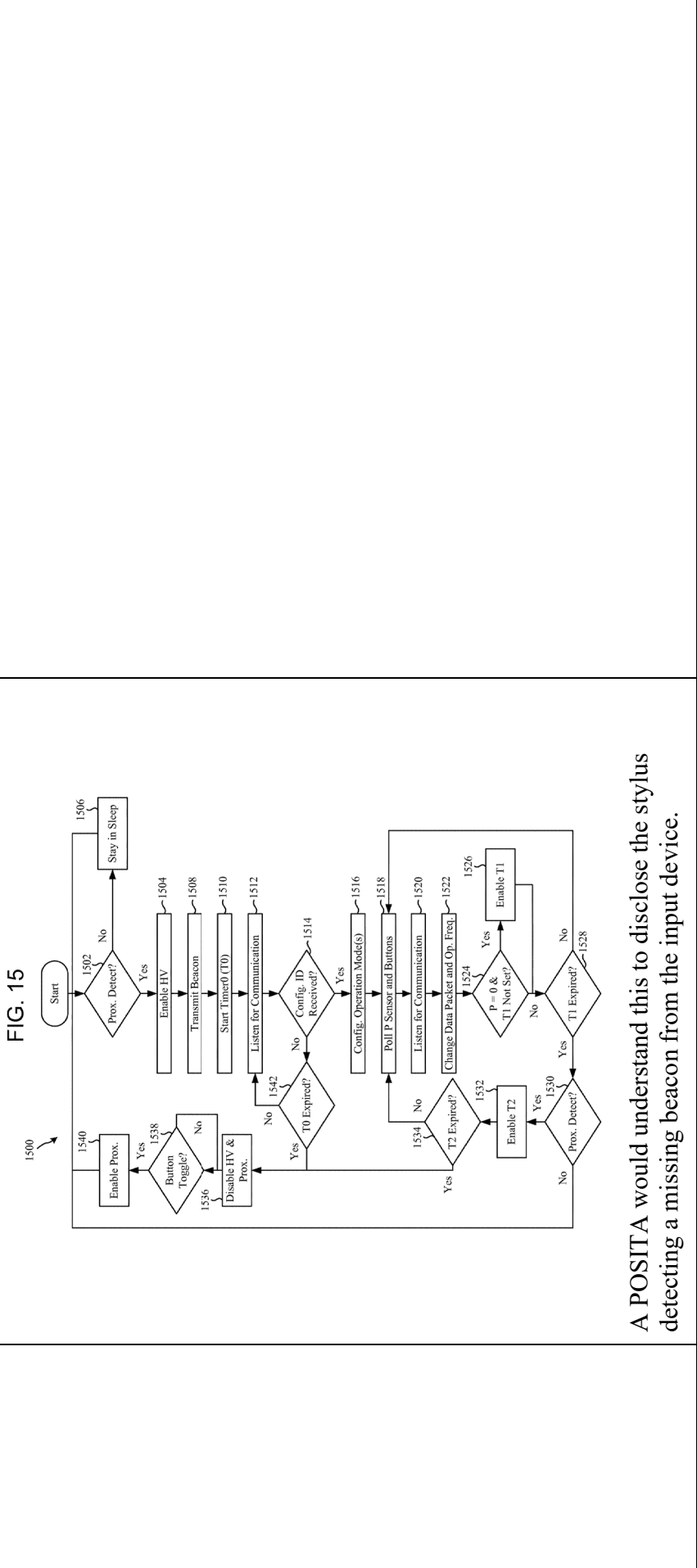
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103)	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”)
	output operating frequency from the host computing device, illustrated as block 1816. This may occur when the touch controller of the host computing device detects noise at a current or first operating frequency (which may be a first group of frequencies), and the touch controller may transmit data to change the stylus device's behavior to use a second operating frequency (which may be a second group of frequencies).” <i>Id.</i>	



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21[c] wherein the active pen is unpaired for at least a portion of the prior beacon period; and	<i>See supra</i> regarding 10[d]. The active pen in Sundara-Rajan is unpaired prior to connection with a new host device. Sundara-Rajan, at 16:44-17:26; Fig. 18.	The stylus disclosed in Kremin’926 is unpaired during at least a portion of the prior beacon period, as discussed in 19[a]-[b] and shown in Figures 9 and 10: FIG. 9 FIG. 10
21[d] send, in response to the prior beacon, an acknowledgment to trigger pairing	<i>See supra</i> regarding 10[c]. Sundara-Rajan discloses a handshake packet periodically “transmitted by the touch controller.” In the time between transmissions, the touch controller listens for a stylus transmission that matches or acknowledges the requested operation. Once the correct	Kremin’926 discloses that the stylus transmits a TX signal that is received by the host device. Kremin’926, at ¶¶0062-64. The TX signal may “include[] additional data (e.g.,...button data, etc.)” <i>id.</i>, which a POSITA would also understand could include an acknowledgment. The stylus includes a phase-

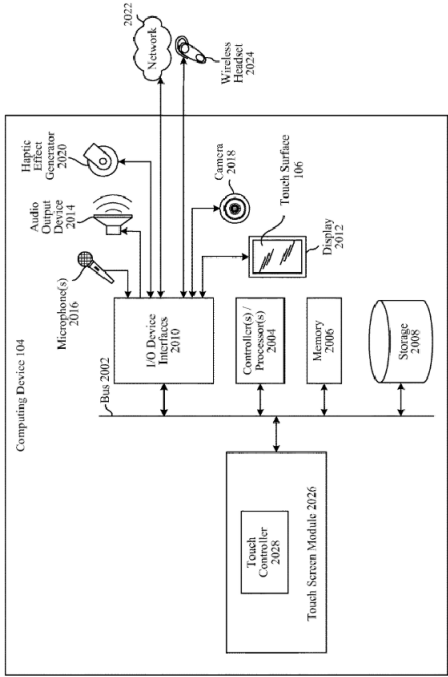
Claim Elements U.S. Patent No. 9,977,519	Primary Reference: U.S. Patent No. 9,606,680 (“Sundara-Rajan”) (35 U.S.C. § 102 or 103) stylus operation is detected, the touch controller may cease transmitting the handshake signals...” Sundara-Rajan, at 10:62-11:30.	Secondary Reference: U.S. Patent Application Publication 2013/0207926 (“Kremin’926”) locked loop (PLL) circuit 870, which “may synchronize the operation of the stylus 850 to the host 805 on a cycle-by-cycle basis.” Kremin’926, at ¶¶0062-64. “The stylus may detect the synchronization burst transmitted at time interval 1005 and synchronize the operation of the stylus to the host using the synchronization burst (e.g., using the PLL...)” <i>Id.</i> ¶0069.
Claim 23		
23[pre] The active pen, of claim 21, further comprising:	<i>See supra</i> regarding 20[pre].	
23[a] a determination module configured to:	Sundara-Rajan discloses the use of a Configuration ID that is passed from the touch controller to the stylus during synchronization. <i>See</i> Sundara-Rajan, at 11:11-11:20 (“The frequency synch may be followed by a 2 bit start of frame (0,0), a 3 bit identifier or identification code (also referred to herein as a configuration ID), and a 2 bit end of frame (1,1). This handshake packet may be transmitted by the touch controller about every 10 ms. In the time between transmissions, the touch controller listens for a stylus transmission that matches or acknowledges the requested operation. Once the correct stylus operation is detected, the touch controller may cease transmitting the handshake signals.”). The Configuration ID is described as “an identifier or identification code of the computing device 104, an identifier or identification code corresponding to an encoding scheme and/or an operating frequency stored on the stylus device 102, or other information for communicating a mode of operation to the stylus device 102.” <i>Id.</i> at 10:55-10:61.	

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	The Sundara-Rajan stylus’s ability to detect the configuration ID would inform a POSITA that the stylus has a determination module. <i>See also id.</i> at 12:34-12:55 (“Fig. 15 illustrates a method 1500 to determine when the stylus is being used and should remain in active mode and when the stylus is not being used and should enter a sleep mode to conserve power. . . . At block 1502, the stylus device determines whether the stylus device is being used by a user. . . . In some embodiments, the stylus device may poll the proximity sensor to determine whether the proximity sensor has detected the presence of a user and if no reading from the proximity sensor is received/detected for a predefined time, the stylus device may return/remain in the sleep mode.”).	
23 b detect a missing beacon from the first input device; and	Fig. 15 of Sundara-Rajan “illustrates a method 1500 to determine when the stylus is being used and should remain in active mode and when the stylus is not being used and should enter a sleep mode to conserve power.” Sundara-Rajan, at 12:36-12:39. One situation disclosed in Sundara-Rajan where the stylus would unpair from the input device and go to sleep is “in response to the configuration ID failing to be received.” <i>Id.</i> at 14:13-14:14. Then, “the stylus device determines whether T0 (a listening timeout timer, for example, set at about 30-45 seconds) has expired, illustrated as block 1542. In response to T0 not being expired, the stylus device continues to listen for a communication from the touch controller, illustrated as block 1512. However, in response to T0 being expired, the stylus device proceeds to block 1536 to disable the HV and the proximity sensor(s), and follows the path of blocks 1538-1540” <i>Id.</i> at 14:14-14:22.	



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23[c] set the ID register to zero in response to the missing beacon to unpair the active pen.	As discussed above, when the stylus disclosed in Sundara-Rajan does not receive a configuration ID, it may enter sleep mode. <i>See supra</i> regarding 23[b]. A POSITA may assume that the memory (or “register”) that stores the Configuration ID will also get reset (i.e., the value being “set to zero”) when the stylus goes into the sleep mode. When the stylus gets activated again, it will listen to a new Configuration ID after which the memory will be overwritten by the newly received Configuration ID. A POSITA may assume that the “pen ID” will also get reset when the pen (i.e., stylus) unpairs.	
Claim 24		
24[pre] The active pen of claim 20, wherein the transceiver is further configured to:	<i>See supra</i> regarding 20[pre] – 20[f].	<i>See supra</i> regarding 20[pre] – 20[f].
24[a] receive, from the first input device, a user ID of a user;	Sundara-Rajan discloses an active pen with a transceiver configured to receive information from the host device. Sundara-Rajan discloses that “the computing device 104 may transmit a configuration ID, illustrated as 114, to the stylus device 102 via the carrier frequency.” Sundara-Rajan, at 4:24-4:26. “The configuration ID may correspond to a type of touch controller of the computing device 104 and/or may include other information.” <i>Id.</i> at 4:26-4:28. A POSITA could reasonably expect that such “other information” could include a user ID of a user. Additionally, Sundara-Rajan discloses the touch controller of the host device transmitting “a handshake packet to the stylus device using the capacitive link.” <i>Id.</i> at 10:34-10:36.	Kremin ’926 discloses an active pen with a transceiver configured to receive information from the host device. Kremin ’926 discloses that the timing and phase of the TX signal from the host device may be calculated from the encoded data the active pen receives. <i>See</i> Kremin ’926, at ¶0061 (“In another embodiment, the any combination of the frequency, timing, and phase of the TX signal 727 may be calculated from data encoded in the synchronization burst 729.”). Kremin ’926 also discloses that, “In one embodiment, this synchronization may be performed using one or more of the electrodes of the sense array 201 to transmit a synchronization signal 230 to the active stylus 130. The active stylus 130 may detect (e.g., sense) and demodulate the

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	“As part of the handshake, or in a different communication, using the electrodes, the touch controller may transmit configuration information to the stylus device 102 to request the stylus device 104 to operate in a certain mode. The stylus may use this configuration information to configure (1409) its operation to match the computing device 104. The configuration information may include an identifier or identification code of the computing device 104, an identifier or identification code corresponding to an encoding scheme and/or an operating frequency stored on the stylus device 102, or other information for communicating a mode of operation to the stylus device 102.” <i>Id.</i> at 10:50-10:61. Sundara-Rajan also discloses a host device communicating the proper frequency to a stylus (or active pen). <i>See, e.g., id.</i> at 10:33-11:10, 13:24-13:39. It would be obvious to a POSITA that the information communicated from the host device could include a user ID of a user.	synchronization signal 230 using receiver 226. The MCU 224 may process the synchronization signal 230 to synchronize the timing of the sensing performed by the processing core 210 and the transmission of the TX signal 227 by the active stylus 130.” <i>Id.</i> at ¶0036. A POSITA would understand that “the synchronize . . . the transmission of the TX signal by the active stylus” could mean that the demodulated synchronization contains information regarding the TX signal transmission such as a user ID of a user. It would be obvious to a POSITA that the information communicated from the host device could include a user ID of a user.
24 b send the user ID to a second input device during a pairing of the second input device.	Sundara-Rajan discloses that other input devices can be connected to the host device:	

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	FIG. 20  It would be obvious to a POSITA that the active pen could transmit information, such as the user ID, to these other input devices.	