Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2715761 A1 2011/03/28

(21) 2 715 761

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2010/09/24

(41) Mise à la disp. pub./Open to Public Insp.: 2011/03/28

(30) Priorités/Priorities: 2009/09/28 (US61/246,205); 2010/09/23 (US12/888,752)

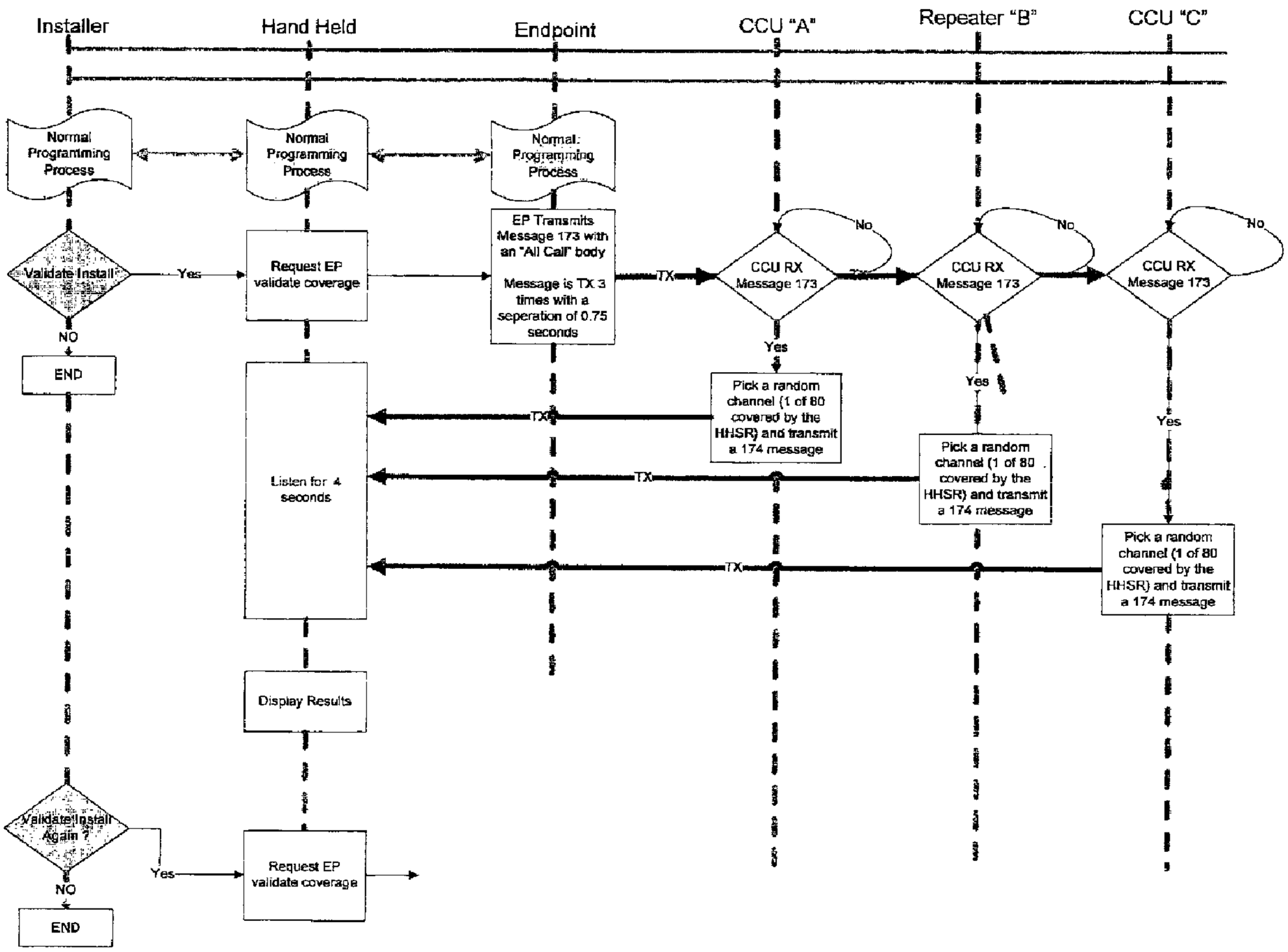
(51) Cl.Int./Int.Cl. *H04W 24/06* (2009.01), *H04W 64/00* (2009.01)

(71) Demandeur/Applicant:
ITRON, INC., US

(72) Inventeurs/Inventors:
OSTERLOH, CHRISTOPHER L., US;
JOHNSON, MATTHEW, US

(74) Agent: SMART & BIGGAR

(54) Titre : METHODOLOGIE ET EQUIPEMENT PERMETTANT DE VALIDER LA COUVERTURE D'UN RESEAU
(54) Title: METHODOLOGY AND APPARATUS FOR VALIDATING NETWORK COVERAGE



(57) Abrégé/Abstract:
Disclosed are apparatus and methodology for validating network coverage (i.e., desired functionality) of newly installed network devices. Per use of presently disclosed technology, equipment installers may confirm both one and two way communications

CA 2715761 A1 2011/03/28
(21) 2 715 761
(13) A1

(57) Abrégé(suite)/Abstract(continued):
abilities of newly installed network devices as well as receive network diagnostic related data to assist them in the equipment installation process. Validation of communications operation may be initiated by any of the newly installed equipment, a handheld device, or via mobile device communications.

ABSTRACT OF THE DISCLOSURE

Disclosed are apparatus and methodology for validating network coverage (i.e., desired functionality) of newly installed network devices. Per use of presently disclosed technology, equipment installers may confirm both one and two way communications abilities of newly installed network devices as well as receive network diagnostic related data to assist them in the equipment installation process. Validation of communications operation may be initiated by any of the newly installed equipment, a handheld device, or via mobile device communications.

TITLE: METHODOLOGY AND APPARATUS FOR VALIDATING NETWORK COVERAGE

PRIORITY CLAIM

[0001] This application claims the benefit of previously filed U.S. Provisional Patent Application entitled "NETWORK COVERAGE VERIFICATION SYSTEM AND TOOLS," assigned USSN 61/246,205, filed September 28, 2009, and which is incorporated herein by reference for all purposes.

FIELD OF THE INVENTION

[0002] The present technology relates to network communications. More particularly, the present technology relates to apparatus and methodologies for confirming communicational operation of an installed network device vis-à-vis such network at the time of installation of such device.

BACKGROUND OF THE INVENTION

[0003] Typically, the installation of new devices within a network has previously relied on either, or a combination of, pre-install propagation modeling and post install review of system performance data, sometimes hours, days, or even weeks after the installer has left the area. While both of such techniques and combinations thereof are useful in their own right and do provide value, they do not provide the real time definitive feedback desired by install crews to fix issues while on-site, in order to thereby avoid costly return visits.

[0004] While various methodologies have been developed for the installation of network enabled devices, no design has emerged that generally encompasses all of the desired characteristics as hereafter presented in accordance with the subject technology.

SUMMARY OF THE INVENTION

[0005] In view of the recognized features encountered in the prior art and addressed by the present subject matter, improved apparatus and methodologies for validating network coverage of newly installed network end devices have been provided.

[0006] In an exemplary configuration, communicative operability of a newly installed end device may be confirmed as between a network reading device while installers are still on site performing such installation efforts.

[0007] In one of their simpler forms, an end device initiates a request to a network reading device and quickly receives a validation response.

[0008] Another positive aspect of the presently disclosed type of device is that, in addition to a validating response, other data may be returned to the end device to assist the installer during the installation process.

[0009] In accordance with aspects of certain embodiments of the present subject matter, methodologies are provided to validate network coverage for a newly installed end device while otherwise insuring minimal impact on normal network operations.

[0010] In accordance with still other aspects of other embodiments of the present subject matter, methodologies have been developed to ensure establishment of a robust network link for newly installed end devices while requiring minimal user interaction.

[0011] In accordance with yet additional aspects of further embodiments of the present subject matter, apparatus and accompanying methodologies have been developed to analyze end device data to assist in refining pre-planned coverage analyses.

[0012] According to yet still other aspects of additional embodiments of the present subject matter, apparatus and methodologies have been developed to continually examine communication coverage.

[0013] One exemplary embodiment of the present subject matter relates to a network coverage validation apparatus for validating wireless communication

operability for a network of RF transceivers, comprising a testing device for initiating transmission of a validation message intended for in-range transceivers of such network of RF transceivers, and for listening for any reply messages from such RF transceivers.

[0014] In some variations of the foregoing apparatus, the RF transceivers may comprise a plurality of cell control units and repeaters, each of which has RF transceiver functionality, with such repeaters providing communications between selected of such cell control units, and with such cell control units providing communications with a plurality of data generating endpoints associated therewith. In still further alternatives of the foregoing, such reply messages may comprise a randomly timed transmission which includes data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver. Still further, such exemplary testing device may include GPS functionality for logging the location of such testing device upon receipt of any reply messages from such network of RF transceivers.

[0015] In yet other present alternatives, such testing device may initiate such validation message transmission at periodic intervals while such testing device is continuously relocated relative to such network, for mapping the wireless communication operability for such network.

[0016] In other present alternative embodiments of the foregoing apparatus, such reply messages may comprise a randomly timed transmission which may include data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver. Further, such testing device may include GPS functionality for logging the location of such testing device upon receipt of any reply messages from such network of RF transceivers, and means for correlating reply messages and logged locations, for mapping the wireless communication operability for such network.

[0017] Another present exemplary embodiment of the present subject matter relates to a network coverage verification tool for confirming RF communication operability for a data endpoint intended for RF association with a network of RF transceivers, comprising an installation testing device for initiating transmission of

a validation message from an endpoint to be validated, and for listening for any reply message data originating from such network of RF transceivers.

[0018] In some present alternatives, such tool may further include means for displaying the results of any reply message data received by such installation testing device. In other alternatives, such installation testing device may comprise a mobile, handheld device field-usable by an installer for real time checking of communication operability of an installed endpoint. Further, such installation testing device may include means for placing such endpoint to be validated, after transmission of such validation message, into a receive and retransmit mode for receiving reply messages originating from such network of RF transceivers and for forwarding reply message data to such testing device.

[0019] In yet other present alternative tool embodiments, such reply message data may include data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver. Further, in some embodiments, such validation message transmission may be initiated a plurality of times at intervals, and such RF transceivers may transmit reply messages on randomly selected communications channels. In some present alternatives, such validation message may include data for requesting response from any receiving RF transceiver of such network, and such RF transceivers may transmit reply messages at randomly selected times after a predetermined minimum amount of delay after receipt of a validation message.

[0020] In other present alternative embodiments, such exemplary installation testing device may include means for directly receiving reply messages originating from such network of RF transceivers.

[0021] It should be fully understood by those of ordinary skill in the art from the complete disclosure herewith that the present subject matter equally relates to both apparatus and corresponding and/or related methodology. One present exemplary embodiment relates to methodology for validating wireless communication operability for a data collection network of the type comprising a plurality of data endpoints intended for RF association with a network of RF transceivers, such methodology comprising initiating transmission of a validation

message intended for in-range transceivers of such network of RF transceivers; and listening for any reply messages originating from such RF transceivers.

[0022] In some present alternatives, such initiating may include initiating transmission of a validation message from one of an endpoint to be validated and a mobile device provided for transmission of validation messages; and such listening may include listening for any reply message data originating from such network of RF transceivers. In other present variations, such listening may alternatively include receiving any reply messages one of directly from such RF transceivers, and indirectly from a data endpoint having received such reply messages directly from such RF transceivers and retransmitting same.

[0023] Yet in other present alternative methodology embodiments, such RF transceivers may comprise a plurality of cell control units and repeaters, each of which has RF transceiver functionality; such initiating may include initiating transmission of a validation message from a mobile device provided for transmission of validation messages; such reply messages may comprise a randomly timed transmission which may include data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver; and such methodology may further include using GPS functionality and logging the location of such mobile device upon receipt of any reply messages thereat from such network of RF transceivers while moving such mobile device around in such network, and correlating such reply messages and logged locations. Such arrangement contributes to advantageously mapping the wireless communication operability for such network.

[0024] In other present alternatives, present methodologies may further include displaying the results of listening for any reply messages.

[0025] Still others may further include using a mobile, handheld device field-usable by an installer for such initiating step, for real time checking of communication operability of an installed endpoint. Other present alternative methodology may further include initiating such validation message transmission a plurality of times at intervals; and wherein such RF transceivers transmit reply messages on randomly selected communications channels. Per still other alternatives, such validation message may include data for requesting response

from any receiving RF transceiver of such network; and such RF transceivers may transmit reply messages at randomly selected times after a predetermined minimum amount of delay after receipt of a validation message.

[0026] Other alternative present methodologies may further include newly installing a data endpoint for RF association with an existing network of RF transceivers; and validating wireless communication operability for such newly installed data endpoint. Such validating preferably may include transmitting a validation message from such newly installed data endpoint, listening with such newly installed data endpoint for any reply messages from such RF transceivers, retransmitting reply message related data from such newly installed data endpoint to a receiver, and assessing such retransmitted reply message related data in order to validate wireless communication operability for such newly installed data endpoint.

[0027] Yet other alternative embodiments of present methodology may include such reply messages including data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver; and assessing reply message data to respectively determine the quality of wire communication operability coverage at the locations of selected of such plurality of data endpoints.

[0028] Additional objects and advantages of the present subject matter are set forth in, or will be apparent to, those of ordinary skill in the art from the detailed description herein. Also, it should be further appreciated that modifications and variations to the specifically illustrated, referred and discussed features, elements, and steps hereof may be practiced in various embodiments and uses of the present subject matter without departing from the spirit and scope of the present subject matter. Variations may include, but are not limited to, substitution of equivalent means, features, or steps for those illustrated, referenced, or discussed, and the functional, operational, or positional reversal of various parts, features, steps, or the like.

[0029] Still further, it is to be understood that different embodiments, as well as different presently preferred embodiments, of the present subject matter may include various combinations or configurations of presently disclosed features,

steps, or elements, or their equivalents (including combinations of features, parts, or steps or configurations thereof not expressly shown in the figures or stated in the detailed description of such figures). Additional embodiments of the present subject matter, not necessarily expressed in the summarized section, may include and incorporate various combinations of aspects of features, components, or steps referenced in the summarized objects above, and/or other features, components, or steps as otherwise discussed in this application. Those of ordinary skill in the art will better appreciate the features and aspects of such embodiments, and others, upon review of the remainder of the specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] A full and enabling disclosure of the present subject matter, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

[0031] Figure 1 is a form of flow chart illustration of a first embodiment of an end device installation tool, in accordance with the present subject matter;

[0032] Figure 2 is a form of a flow chart of an alternative configuration of an end device installation tool in accordance with the present subject matter, that encloses the end device in both sides of a link; and

[0033] Figure 3 is a form of a flow chart of a further alternate configuration of an end device installation tool in accordance with the present subject matter, in a mobile configuration.

[0034] Repeat use of reference characters throughout the present specification and appended drawings is intended to represent same or analogous features, elements, or steps of the present subject matter.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0035] As discussed in the Summary of the Invention section, the present subject matter is particularly concerned with improved apparatus and methodologies for validating network coverage of installed network end devices.

In accordance with present technology, equipment installers are able to ascertain whether an installed endpoint can successfully communicate with a network both uni-directionally and bi-directionally, i.e., both one way and two way, prior to departing the install site. Ascertainment of such operational certainty not only reduces costs by avoiding follow up visits to the site but also engenders improved customer perception of system capabilities, as well as timely implementation of actual system performance.

[0036] It should be appreciated that while the present technology is primarily presently described herein as used in conjunction with initial installation of devices, the present technology may also be applied to previously installed devices as, for example, a check validation of their continued network communication capabilities.

[0037] Selected combinations of aspects of the disclosed technology correspond to a plurality of different embodiments of the present subject matter. It should be noted that each of the exemplary embodiments presented and discussed herein should not insinuate limitations of the present subject matter. Features or steps illustrated or described as part of one embodiment may be used in combination with aspects of another embodiment to yield yet further embodiments. Additionally, certain features may be interchanged with similar devices or features or steps not expressly mentioned which perform the same or similar function.

[0038] At the highest level of abstraction, the primary reading technology -- exemplary cell control units (CCU's) and repeaters within an automatic meter reading (AMR) network -- must respond to end device requests for validation of coverage. Cell Control Units (CCU's) correspond to neighborhood concentrators devices within a radio-based fixed network system that collect meter reading information, provide advanced metering functions, and send metering data to the host processor via a wide area communications network ("WAN"). It should be appreciated by those of ordinary skill in the art that while the present description relates more to radio-based fixed networks, such is not a specific limitation of the present subject matter as similar/equivalent methodologies may be used with equal efficacy in wired networks.

[0039] Regardless of the type of network employed, validation of coverage for a newly installed end device per the present subject matter must be done quickly and with a minimal impact on normal operations and channel capacity. As such, the validation process should preferably not take more than a minute of the installer's time and should have no impact to other parts of normal system operation. Such validation must also attempt to take into account differences in end device RF performance, if a device, e.g., a hand held (HH) device, other than the actual endpoint is used for all or part of the validation process.

[0040] Reference will now be made in detail to the presently preferred embodiments of the subject network coverage verification system and tools. Referring now to the drawings, Figure 1 illustrates a self-explanatory/labeled form of flow chart illustration of an exemplary first embodiment of an end device installation tool while Figure 2 illustrates (in self-explanatory/labeled form) an exemplary alternative configuration of an end device installation tool that encloses the end device in both sides of a link. As shown in all of the figures, there are a variety/plurality of devices that are actuated in parallel and generally along a time axis. The plural parallel events are illustrated for each respective device or station in Y-axis arrangement, spaced in parallel from one another along an X-axis arrangement. As will be understood by those of ordinary skill in the art, a time axis is generally represented along the Y-axis direction in such figures, with the initial or "zero" time at the top of the indicated Y-axis and with time progressing (i.e., advancing) as one looks or moves down the respective Y-axes in parallel. Stated another way, time starts near the top of each of the figures and progresses as one moves down toward the bottom of each of the figures, along the respective Y-axes.

[0041] As represented, and as will be understood by those of ordinary skill in the art considering both the present specification and attached figures, the basic flow is that an end device initiated request (either HH or endpoint) is sent up to the reading technology (either CCU or repeater), and then returned in a relatively very short time interval where the maximum response time is known. The data returned allows not only validation of the link, i.e., a Go – No Go response, but also in certain embodiments has the ability to carry additional diagnostic information that may be of use to the installer. Such additional or other diagnostic data may

include, but is not limited to, received signal strength indicator (RSSI) of the end device to reader link, the number of readers that heard the device, the reader type, and the RSSI of the reader to end device link.

[0042] As will be understood by those of ordinary skill in the art from the complete disclosure herewith, including the features illustrated and represented in the subject drawings, a given endpoint, under direction of an installation testing device or handheld device or equivalent, may be placed into a receive and retransmit mode (particularly as represented in present Figure 2). Preferably, after transmission of a validation message, such given endpoint is in a receive and retransmit mode fore receiving reply messages originating from the network of RF transceivers and for forwarding reply message data to such testing device or handheld device, or equivalent. Those of ordinary skill in the art will understand various ways of accomplishing such functionality, all of which comprise means for such functionality in accordance with the present disclosure.

[0043] Communications are designed such that minimal user (i.e., installer) interaction is required but a robust link is nonetheless established. Per the present subject matter, this helps to ensure that transient anomalies in the channel are not mistaken for long term channel impairments. To such end, multiple transmissions (randomized over time and/or frequency) are provided for both sides of the link, i.e., to and from the end device.

[0044] A present subject end device may also apply business logic to data received from one or more readers to determine the quality of the coverage at a given location. For example, an inquiry may be made based on available data to determine whether a dual coverage requirement is met for a certain percentage (x%) of the endpoint population. Per present subject matter, such same business logic may include offsets to the received data to compensate for any differences in RF characteristics seen across multiple device families.

[0045] Per the present subject matter, data from the end devices may be respectively combined with GPS data and logged for future analyses, both from a customer compliance point of view, and to continually refine propagation models so that pre-planned coverage analyses can continually be made more accurate. Thought of in other terms, such data combination steps may comprise in some

embodiments means for correlating reply messages and logged locations, for mapping the wireless communication operability for such network.

[0046] With reference now to Figure 3, there is illustrated another self-explanatory, labeled form of a flow chart of a further alternative configuration of the present technology incorporating an end device installation tool in a mobile configuration. By extending the present technology to a mobile drive test scenario, individual end device requests may be replaced by a single mobile device that continually pings all receivers in the area with a "can you hear me" type message, to produce a relatively truer picture of coverage over a wide area.

[0047] In accordance with such present subject matter alternative configuration, the network operating software places the CCU into a mode where it transmits its ID periodically via a normal scheduling process (as will be understood by those of ordinary skill in the art without requiring additional detailed discussion of such aspects). During such time, the CCU would transmit out its serial number a predetermined number of times in a row, each preceded by a preamble. In an exemplary present configuration, such predetermined number of serial transmissions may, for example, be three in number. Other numbers may be practiced per present subject matter, as well as different times from example times herein. Such process may be repeated periodically, for example, approximately every 15 seconds. A radio receiver and display package may be provided to receive the ID key messages and to display the number and quality of CCU transmissions heard. Where such radio receiver or its equivalent is associated with a handheld device (as represented in present Figures 1 and 3), such handheld device (or installation testing device) may be thought of, in pertinent part, as including means for directly receiving reply messages originating from the network of RF transceivers (such as a CCU and/or repeater).

[0048] Such herein referenced display package may comprise any now known or later developed device, such as a screen or print out, and thereby constitute display means for displaying the results of any reply message data received by a present installation testing device, or equivalent functionality. Such present features equally relate to the "Display Results" portion of the present technology as

represented in both present Figures 1 and 2. It is to be equally understood as usable in conjunction with an embodiment based on present Figure 3.

[0049] Such presently disclosed arrangements would allow an installer to validate coverage before leaving the install site. As will be understood by those of ordinary skill in the art from the discussion herein, normal data reading could still occur between transmissions and during non work hours even during the install process.

[0050] While the present subject matter has been described in detail with respect to specific embodiments thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing may readily produce alterations to, variations of, and equivalents to such embodiments. Accordingly, the scope of the present disclosure is by way of example rather than by way of limitation, and the subject disclosure is not intended to preclude inclusion of such modifications, variations and/or additions to the present subject matter as would be readily apparent to one of ordinary skill in the art.

What is claimed is:

1. A network coverage validation apparatus for validating wireless communication operability for a network of RF transceivers, comprising a testing device for initiating transmission of a validation message intended for in-range transceivers of said network of RF transceivers, and for listening for any reply messages from said RF transceivers.

2. An apparatus as in claim 1, wherein said RF transceivers comprise a plurality of cell control units and repeaters, each of which has RF transceiver functionality, with said repeaters providing communications between selected of said cell control units, and with said cell control units providing communications with a plurality of data generating endpoints associated therewith.

3. An apparatus as in claim 2, wherein said reply messages comprise a randomly timed transmission which includes data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver.

4. An apparatus as in claim 3, wherein said testing device includes GPS functionality for logging the location of said testing device upon receipt of any reply messages from said network of RF transceivers.

5. An apparatus as in claim 4, wherein said testing device initiates said validation message transmission at periodic intervals while said testing device is continuously relocated relative to said network, for mapping the wireless communication operability for such network.

6. An apparatus as in claim 1, wherein:

said reply messages comprise a randomly timed transmission which includes data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver; and

said testing device includes GPS functionality for logging the location of said testing device upon receipt of any reply messages from said network of RF transceivers, and means for correlating reply messages and logged locations, for mapping the wireless communication operability for such network.

7. A network coverage verification tool for confirming RF communication operability for a data endpoint intended for RF association with a network of RF transceivers, comprising an installation testing device for initiating transmission of a validation message from an endpoint to be validated, and for listening for any reply message data originating from said network of RF transceivers.

8. A network coverage verification tool as in claim 7, further including means for displaying the results of any reply message data received by said installation testing device.

9. A network coverage verification tool as in claim 7, wherein said installation testing device comprises a mobile, handheld device field-usable by an installer for real time checking of communication operability of an installed endpoint.

10. A network coverage verification tool as in claim 7, wherein said installation testing device includes means for placing such endpoint to be validated, after transmission of said validation message, into a receive and retransmit mode for receiving reply messages originating from said network of RF transceivers and for forwarding reply message data to said testing device.

11. A network coverage verification tool as in claim 7, wherein said reply message data includes data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver.

12. A network coverage verification tool as in claim 7, wherein said validation message transmission is initiated a plurality of times at intervals, and

said RF transceivers transmit reply messages on randomly selected communications channels.

13. A network coverage verification tool as in claim 7, wherein said validation message includes data for requesting response from any receiving RF transceiver of said network, and said RF transceivers transmit reply messages at randomly selected times after a predetermined minimum amount of delay after receipt of a validation message.

14. A network coverage verification tool as in claim 7, wherein said installation testing device includes means for directly receiving reply messages originating from said network of RF transceivers.

15. Methodology for validating wireless communication operability for a data collection network of the type comprising a plurality of data endpoints intended for RF association with a network of RF transceivers, such methodology comprising:

initiating transmission of a validation message intended for in-range transceivers of such network of RF transceivers; and

listening for any reply messages originating from such RF transceivers.

16. Methodology as in claim 15, wherein:

said initiating includes initiating transmission of a validation message from one of an endpoint to be validated and a mobile device provided for transmission of validation messages; and

said listening includes listening for any reply message data originating from said network of RF transceivers.

17. Methodology as in claim 15, wherein said listening includes receiving any reply messages one of directly from such RF transceivers, and indirectly from a data endpoint having received such reply messages directly from such RF transceivers and retransmitting same.

18. Methodology as in claim 15, wherein:

said RF transceivers comprise a plurality of cell control units and repeaters, each of which has RF transceiver functionality;

said initiating includes initiating transmission of a validation message from a mobile device provided for transmission of validation messages;

said reply messages comprise a randomly timed transmission which includes data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver; and

said methodology further includes using GPS functionality and logging the location of said mobile device upon receipt of any reply messages thereat from said network of RF transceivers while moving such mobile device around in such network, and correlating such reply messages and logged locations, for mapping the wireless communication operability for such network.

19. Methodology as in claim 15, further including displaying the results of listening for any reply messages.

20. Methodology as in claim 15, further including using a mobile, handheld device field-usable by an installer for said initiating step, for real time checking of communication operability of an installed endpoint.

21. Methodology as in claim 15, further including:

initiating said validation message transmission a plurality of times at intervals; and

wherein said RF transceivers transmit reply messages on randomly selected communications channels.

22. Methodology as in claim 15, wherein:

said validation message includes data for requesting response from any receiving RF transceiver of said network; and

said RF transceivers transmit reply messages at randomly selected times after a predetermined minimum amount of delay after receipt of a validation message.

23. Methodology as in claim 15, further including:

newly installing a data endpoint for RF association with an existing network of RF transceivers; and

validating wireless communication operability for such newly installed data endpoint by transmitting a validation message from such newly installed data endpoint, listening with such newly installed data endpoint for any reply messages from said RF transceivers, retransmitting reply message related data from such newly installed data endpoint to a receiver, and assessing said retransmitted reply message related data in order to validate wireless communication operability for such newly installed data endpoint.

24. Methodology as in claim 15, wherein:

said reply messages include data identifying the transmitting RF transceiver and indicating the relative strength of the signal of the validation message received by such RF transceiver; and

said methodology further includes assessing reply message data to respectively determine the quality of wire communication operability coverage at the locations of selected of said plurality of data endpoints.

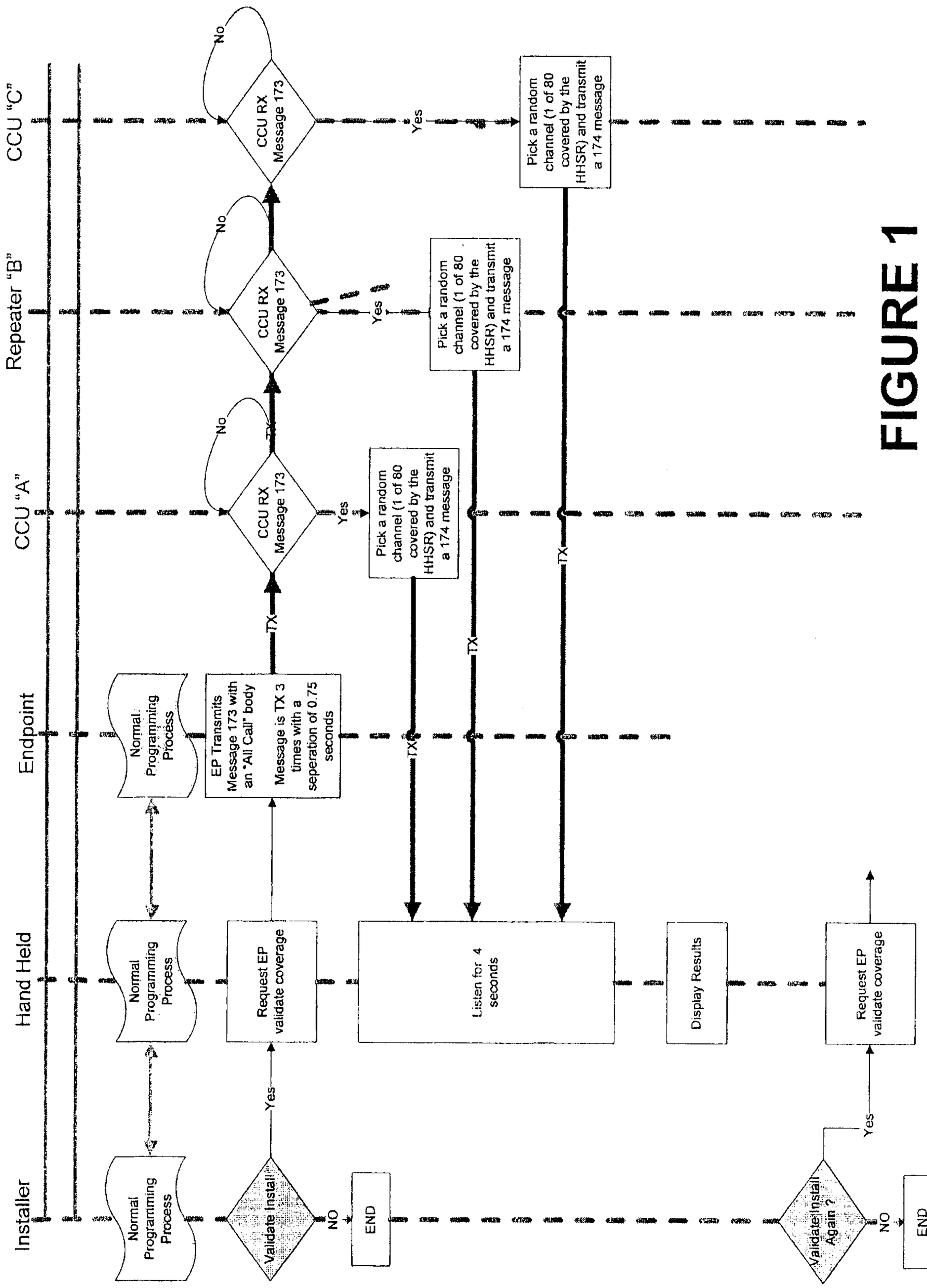


FIGURE 1

Patent Agents
Smart & Biggar

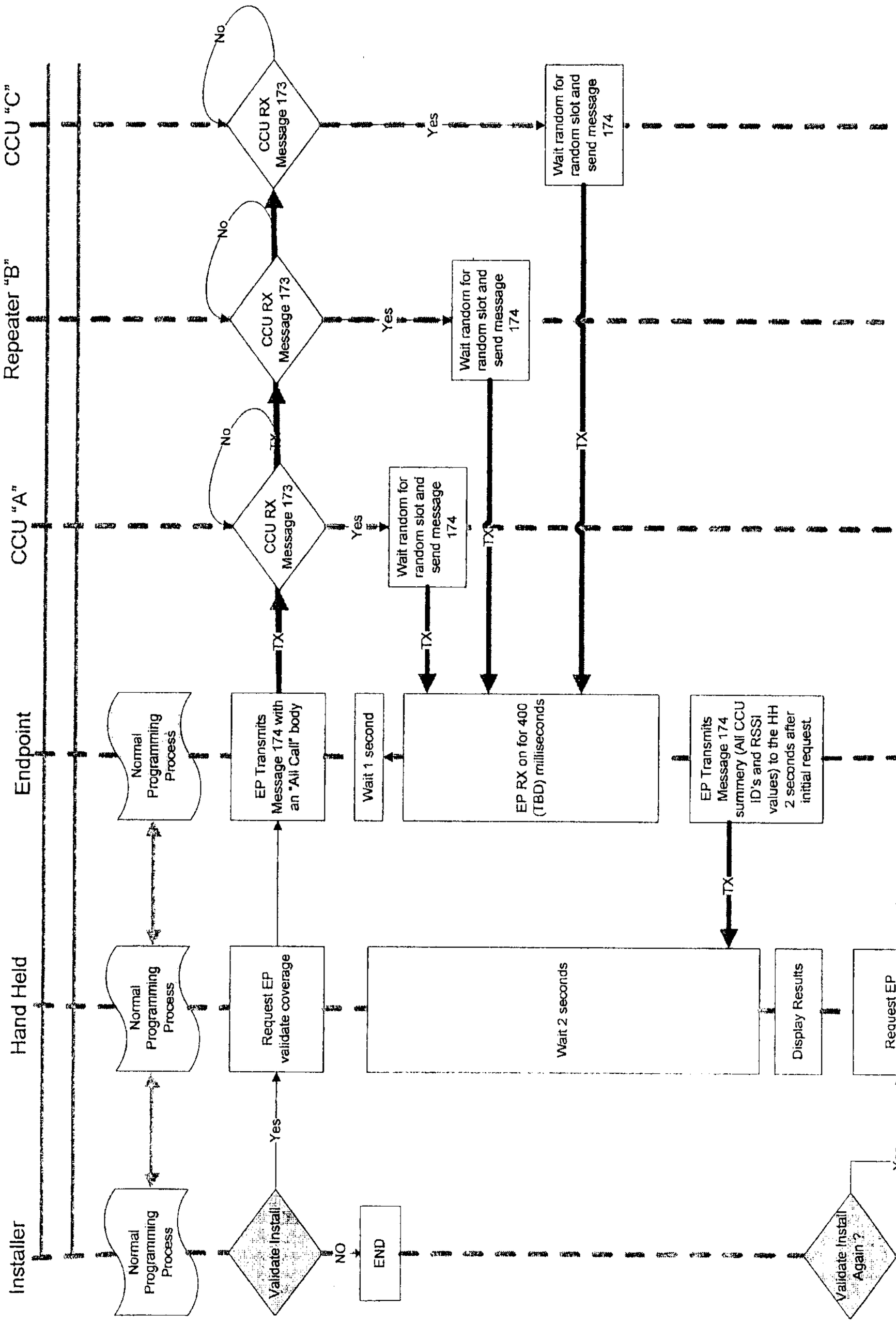


FIGURE 2

Patent Agents
Smart & Biggar

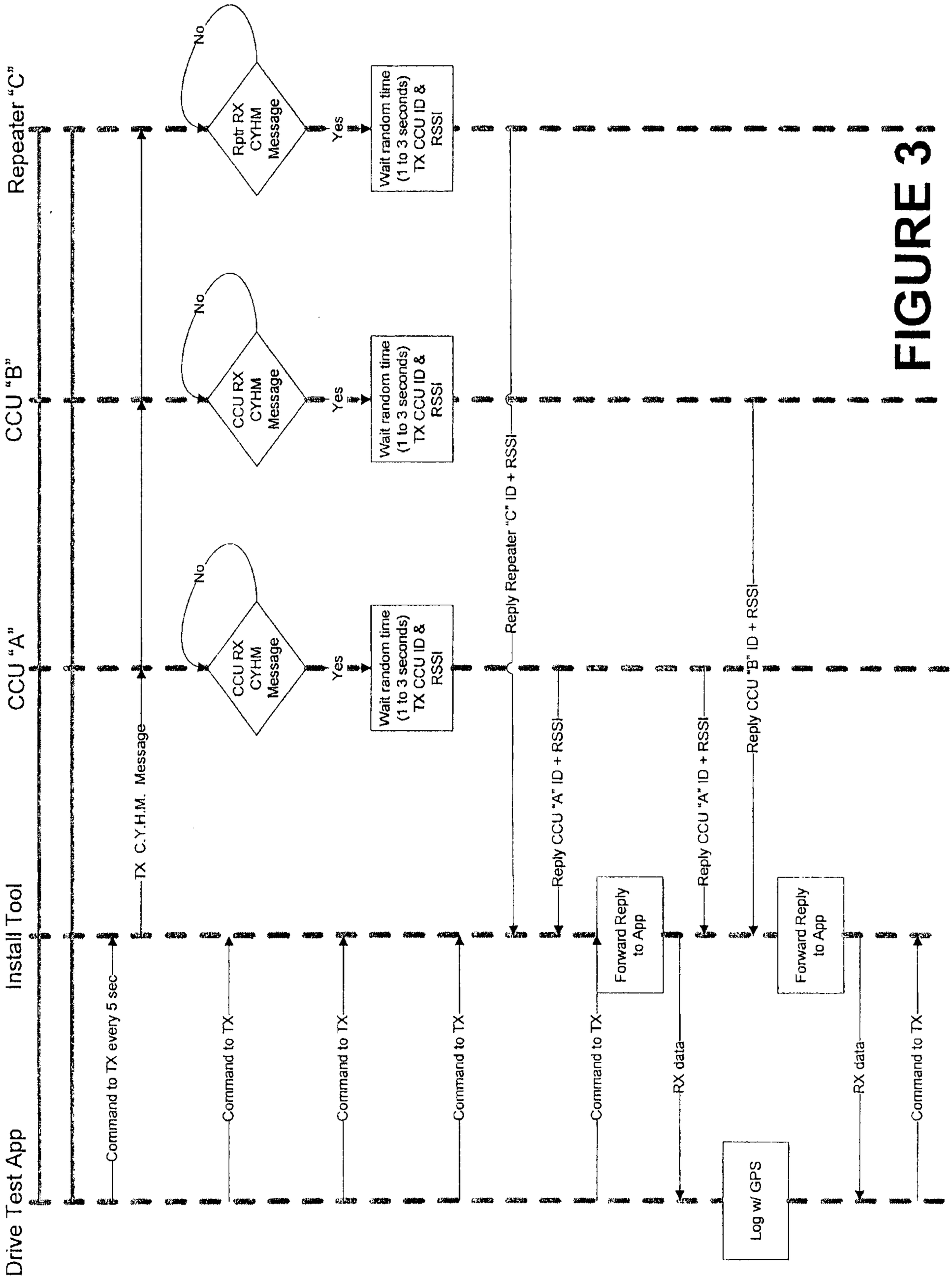
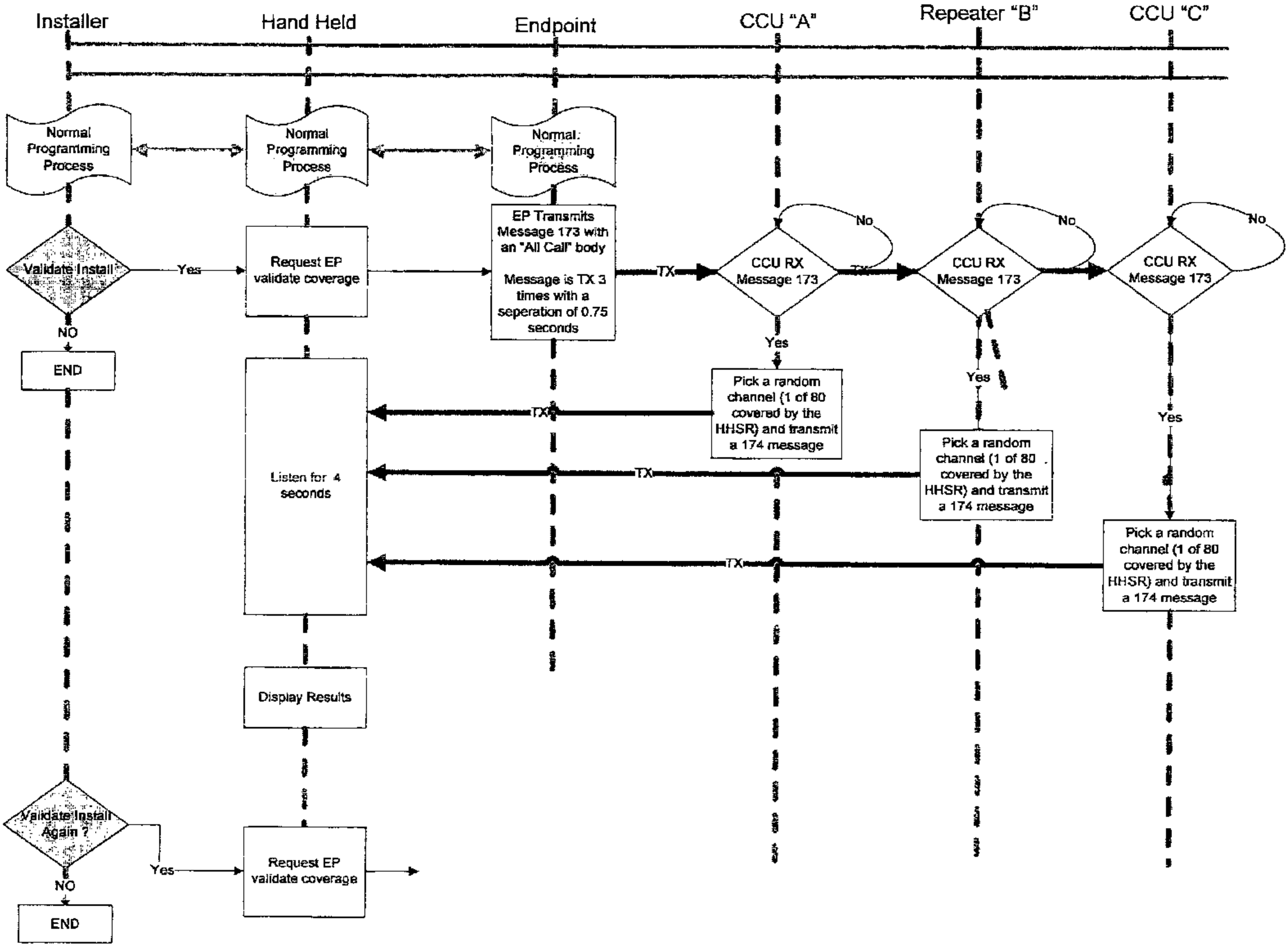


FIGURE 3

Patent Agents
Smart & Biggar


Installer
Hand Held
Endpoint
CCU "A"
Repeater "B"
CCU "C"
Normal Programming Process
Normal Programming Process
Normal Programming Process
Validate Install
Yes
Request EP validate coverage
EP Transmits Message 173 with an "All Call" body
Message is TX 3 times with a seperation of 0.75 seconds
TX
CCU RX Message 173
No
CCU RX Message 173
No
CCU RX Message 173
No
NO
END
Yes
Pick a random channel (1 of 80 covered by the HHSR) and transmit a 174 message
TX
Yes
Pick a random channel (1 of 80 covered by the HHSR) and transmit a 174 message
TX
Yes
Pick a random channel (1 of 80 covered by the HHSR) and transmit a 174 message
TX
Listen for 4 seconds
Display Results
Validate Install Again ?
Yes
Request EP validate coverage
NO
END