IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION

ENCODITECH LLC, Plaintiff, **v.** **RECREATIONAL EQUIPMENT, INC.,** Defendant.	**Civ. No. 6:17-cv-358-RWS-JDL** **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

1. This is an action for patent infringement in which Encoditech LLC makes the following allegations against Recreational Equipment, Inc.

PARTIES

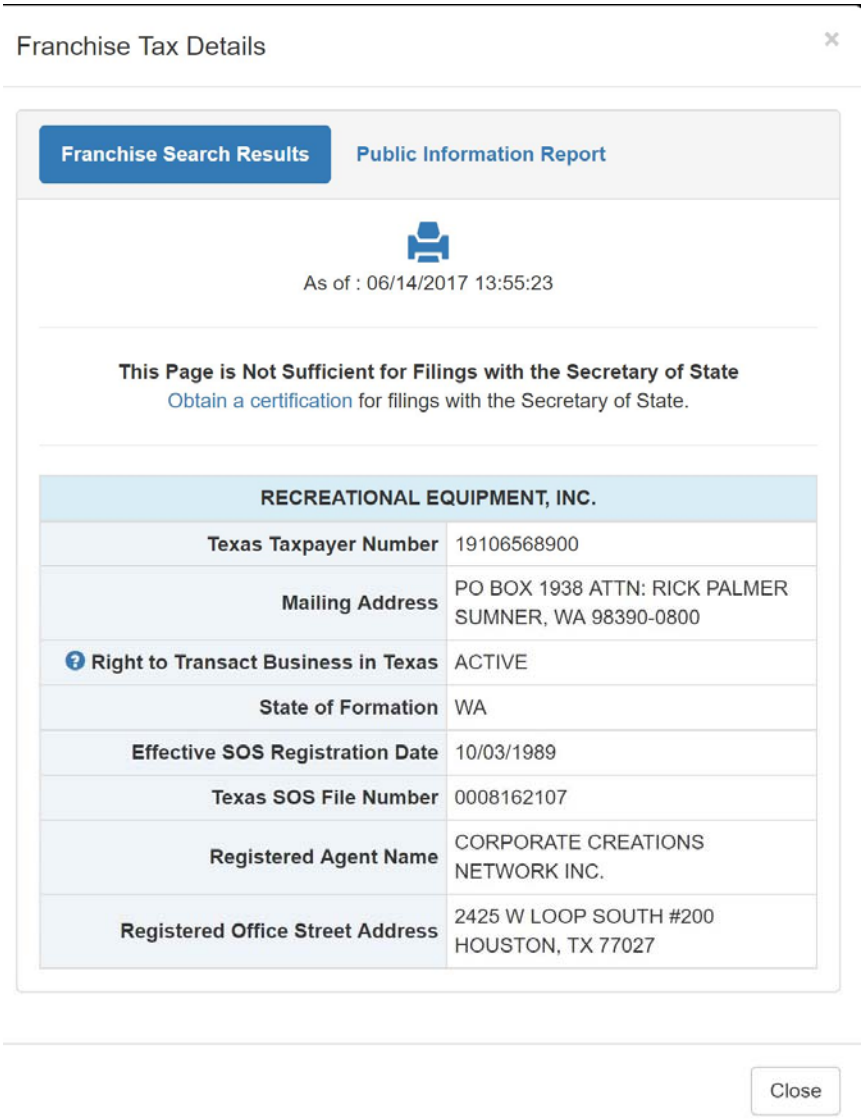
2. Plaintiff Encoditech LLC ("Plaintiff" or "Encoditech") is a Texas limited liability company with its principal place of business at 3415 Custer Rd, Suite 120-A, Plano, Texas 75023.

3. On information and belief, Recreational Equipment, Inc. ("Defendant" or "REI") is a corporation organized and existing under the laws of the State of Washington, with its principal place of business at 6750 S 228th St, Kent, WA 98032.

4. Defendant is a retail and outdoor recreation services corporation, which sells sporting goods, camping gear, travel equipment, and clothing. Defendant also offers services such as outdoor-oriented vacations and courses.

5. Defendant operates over 140 stores in 36 states, including the State of Texas.

6. Defendant is registered to do business in the State of Texas, and has been since at least 1989.



Franchise Tax Details

Franchise Search Results | Public Information Report

As of : 06/14/2017 13:55:23

This Page is Not Sufficient for Filings with the Secretary of State
Obtain a certification for filings with the Secretary of State.

RECREATIONAL EQUIPMENT, INC.	
Texas Taxpayer Number	19106568900
Mailing Address	PO BOX 1938 ATTN: RICK PALMER SUMNER, WA 98390-0800
Right to Transact Business in Texas	ACTIVE
State of Formation	WA
Effective SOS Registration Date	10/03/1989
Texas SOS File Number	0008162107
Registered Agent Name	CORPORATE CREATIONS NETWORK INC.
Registered Office Street Address	2425 W LOOP SOUTH #200 HOUSTON, TX 77027

Close

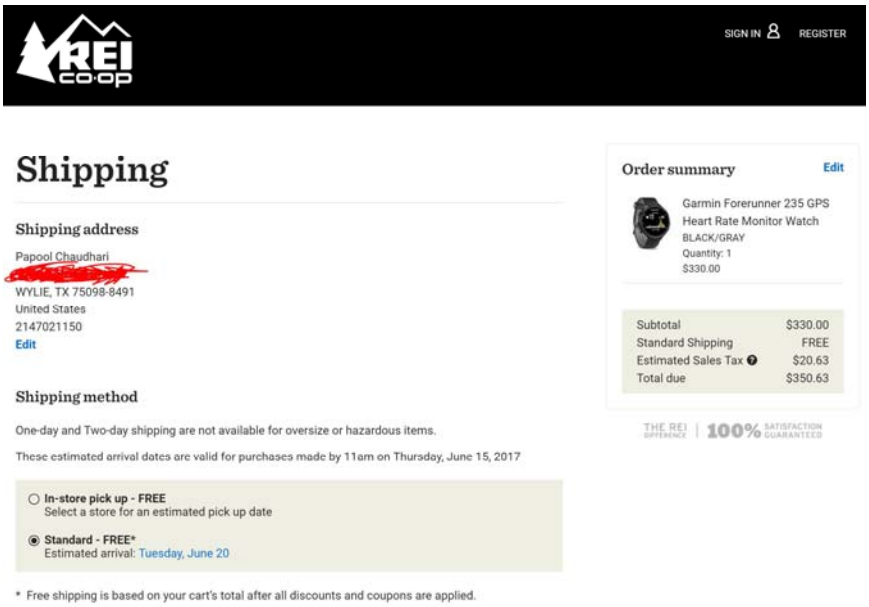
(Source: https://mycpa.cpa.state.tx.us/coa/coaSearch.do)

7. Defendant operates 12 stores in the State of Texas. At least one of those is a location in Plano, Texas, at 2424 Preston Rd, Plano, TX, 75093. This store is located entirely in the Eastern District of Texas and sells products and services to customers who are citizens of this District.

8. Defendant also receives orders via catalogs and the Internet. Notably, Defendant sells products and services through its website, http://www.rei.com.

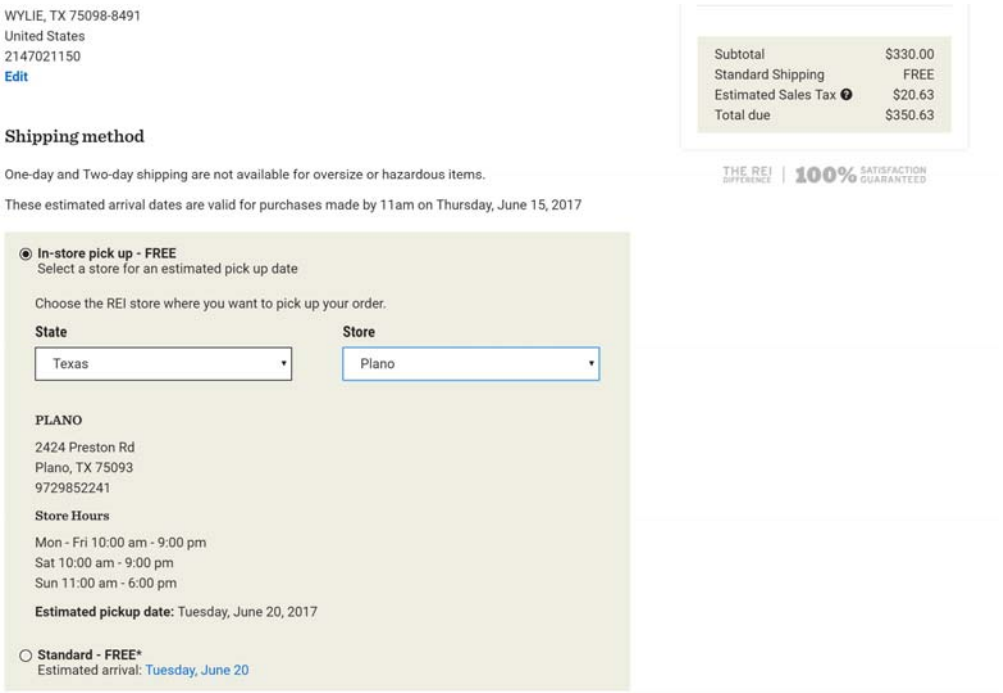
9. Defendant sells items to customers nationwide via the REI website, including customers in this District.

10. As shown below, when a customer in the Eastern District of Texas purchases an item from the REI website, REI collects Texas Sales Tax on that item.



(Source: https://www.rei.com/CheckCart?checkInventory=Y&storeId=8000#!/shipping/methods)

11. As shown above, REI further provides the option for a free "in-store pick up," which includes pick up in the Plano store located in the Eastern District of Texas.



(Source: https://www.rei.com/CheckCart?checkInventory=Y&storeId=8000#!/shipping/methods)

12. Defendant is organized a consumers' co-operative, with, on information and belief, over 6 million members, one or more of which are consumers who reside or have resided in the Eastern District of Texas.

13. On information and belief, Defendant's annual revenue exceeds $2 Billion, of which a portion of said revenue is derived from the sale of products and services to residents of the Eastern District of Texas.

JURISDICTION AND VENUE

14. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

15. Venue is proper in this district under 28 U.S.C. §§ 1391(c) and 1400(b). On information and belief, acts of infringement have occurred in this District, and Defendant has a regular and established place of business in the District, which includes, without limitation, physical retail stores of Defendant in the District and other sales of Defendant's products and services to residents of this District.

16. On information and belief, Defendant is subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, due at least to its substantial business in this forum, including: (i) at least a portion of the infringements alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Texas and in this Judicial District.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 6,321,095 (Fitbit Alta)

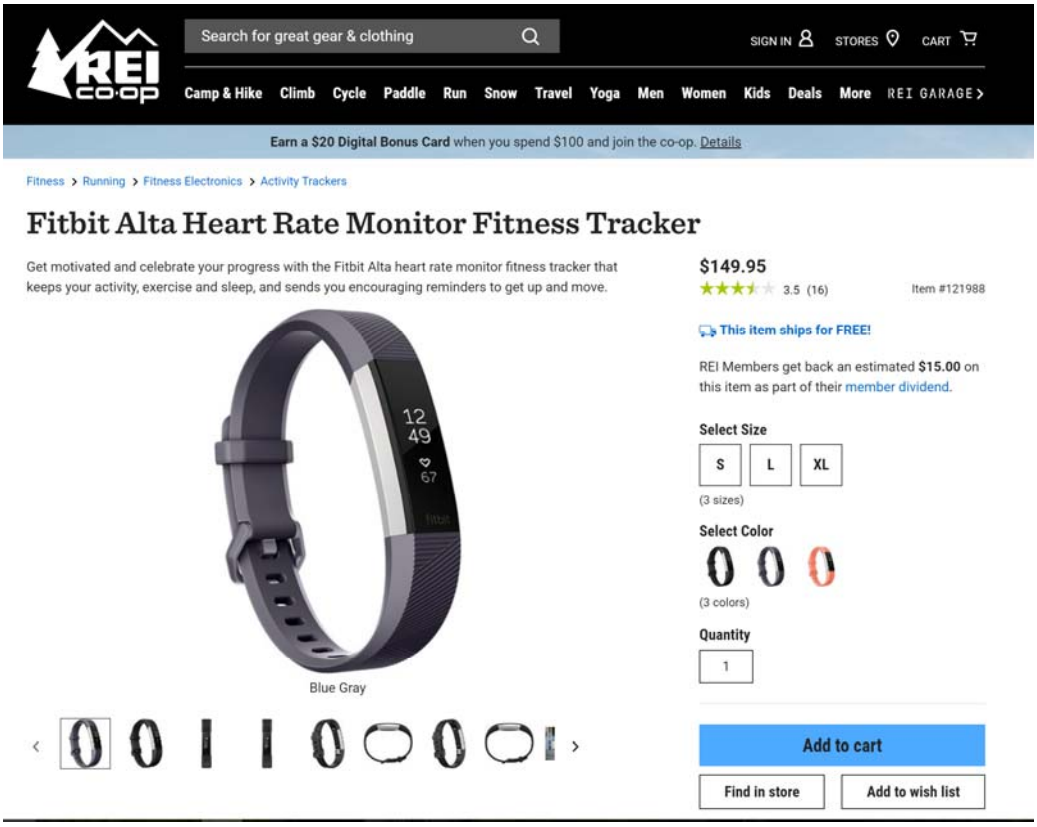
17. Plaintiff is the owner of United States Patent No. 6,321,095 ("the '095 patent") entitled "Wireless Communications Approach." The '095 Patent issued on November 20, 2001. A true and correct copy of the '095 Patent is attached as Exhibit A.

18. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '095 patent. The '095 patent provides, among other things, " A wireless communication system comprising: a first mobile station; and a second mobile station; wherein the first mobile station is configured to select a first portion of a radio

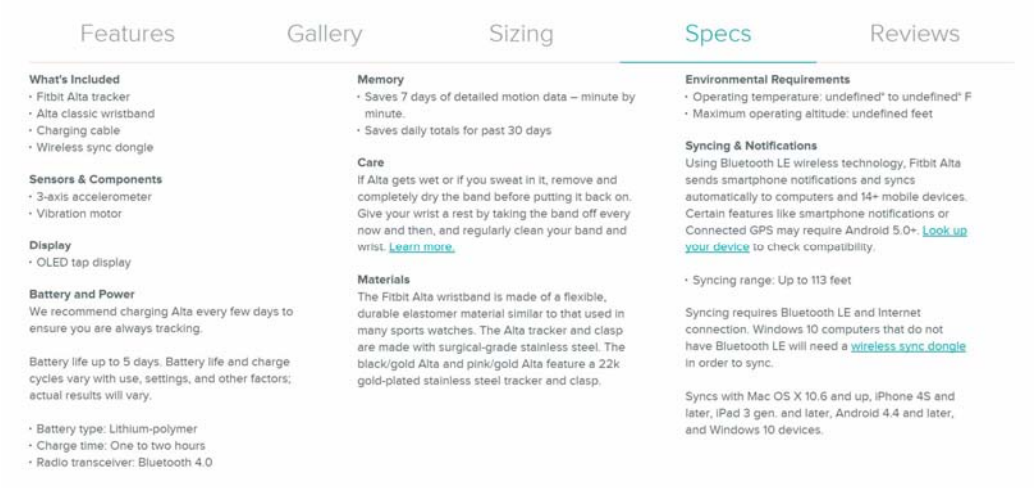
frequency (RF) band to carry communications between the first mobile station and the second mobile station, transmit a first request signal on a first sub-portion of the first portion of the RF band directly to the second mobile station to request communications between the first mobile station and the second mobile station, establish in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band; encrypt the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey, wherein the message exchanged between the first and the second mobile stations are encrypted using the Ckey; and Wherein the second mobile station is configured to transmit, in response to receiving the first request signal from the first mobile station, the first acknowledge signal on a second sub-portion of the first portion of the RF band directly to the first mobile station to acknowledge the first request signal."

19. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services that infringed one or more claims of the '095 patent, including at least Claim 7, in this district and elsewhere in the United States. The Fitbit Alta ("the accused product") forms a wireless communication system along with another mobile station (e.g., phone tablet, or other mobile device). By making, using, importing, offering for sale, and/or selling such products and services, and all like products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '095 patent pursuant to 35 U.S.C. § 271.

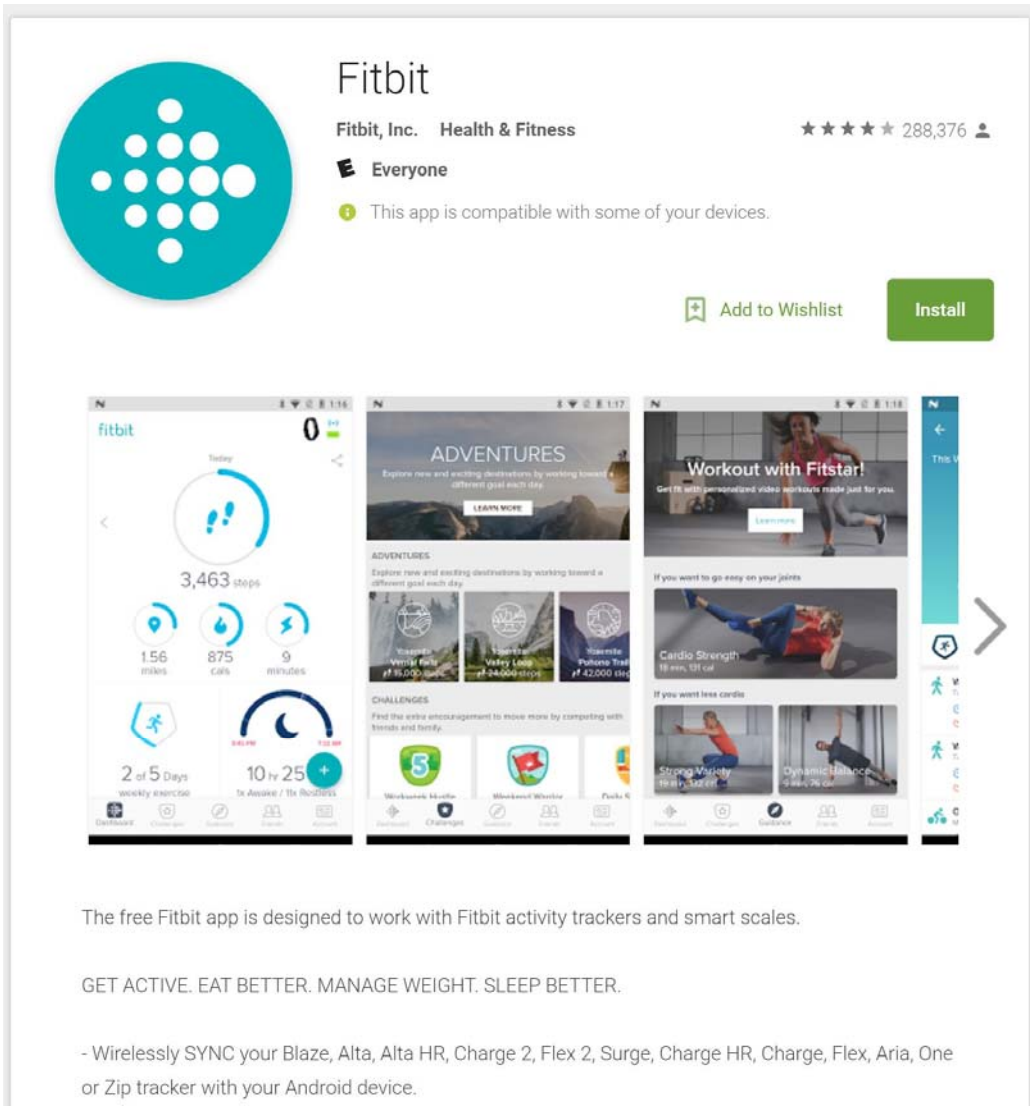
20. Based on present information and belief, the accused product, which is a mobile station, forms a wireless communication system along with another mobile station (e.g., phone, tablet, or other mobile device). The communication protocol employed by the accused product to form the wireless communication system is Bluetooth V4.0 low energy. The wireless communication link is initiated by a companion application installed on the mobile station (e.g. phone or tablet) connected to the accused product.



(https://www.rei.com/product/121988/fitbit-alta-heart-rate-monitor-fitness-tracker)



(https://www.fitbit.com/shop/alta#specs)



(https://play.google.com/store/apps/details?id=com.fitbit.FitbitMobile&hl=en)

Bluetooth	Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.

(Bluetooth V4.0 Spec)

1.1.1 Bluetooth Compliance Requirements

Rev	Date	Comments
4.0	June 30 2010	Updated to support Low Energy, ATT, and GATT support for BR/EDR, and to enable High Speed Controller Subsys-tems.
3.0 + HS	April 21 2009	Updated to include support for the Alternative MAC/PHY feature and High Speed Core Configuration.
v2.1 + EDR	July 26 2007	No content changes. Updates to the Table of Contents.
v2.0 + EDR	Oct 15 2004	This version of the specification is intended to be a sepa-rate Bluetooth Specification that has all the functional char-acteristics of the v1.2 Bluetooth Specification that adds the Enhanced Data Rate (EDR) feature which required changes to Volume 0, Part A, Master Table of Contents.
v1.2	Nov 05 2003	This Part was moved from the Core volume. No content changes been made to this document since v1.1.

(Bluetooth V4.0 Spec)

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, … ,39

Table 2.1: Operating frequency bands

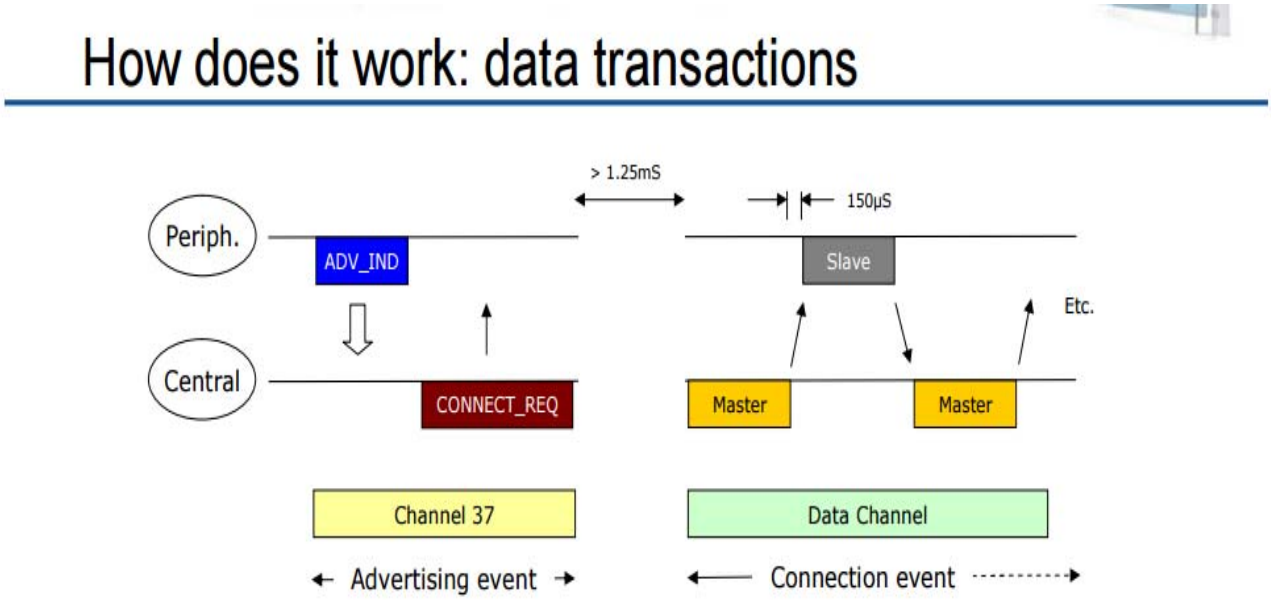
(Bluetooth V4.0 Spec)

1.2 OVERVIEW OF BLUETOOTH LOW ENERGY OPERATION

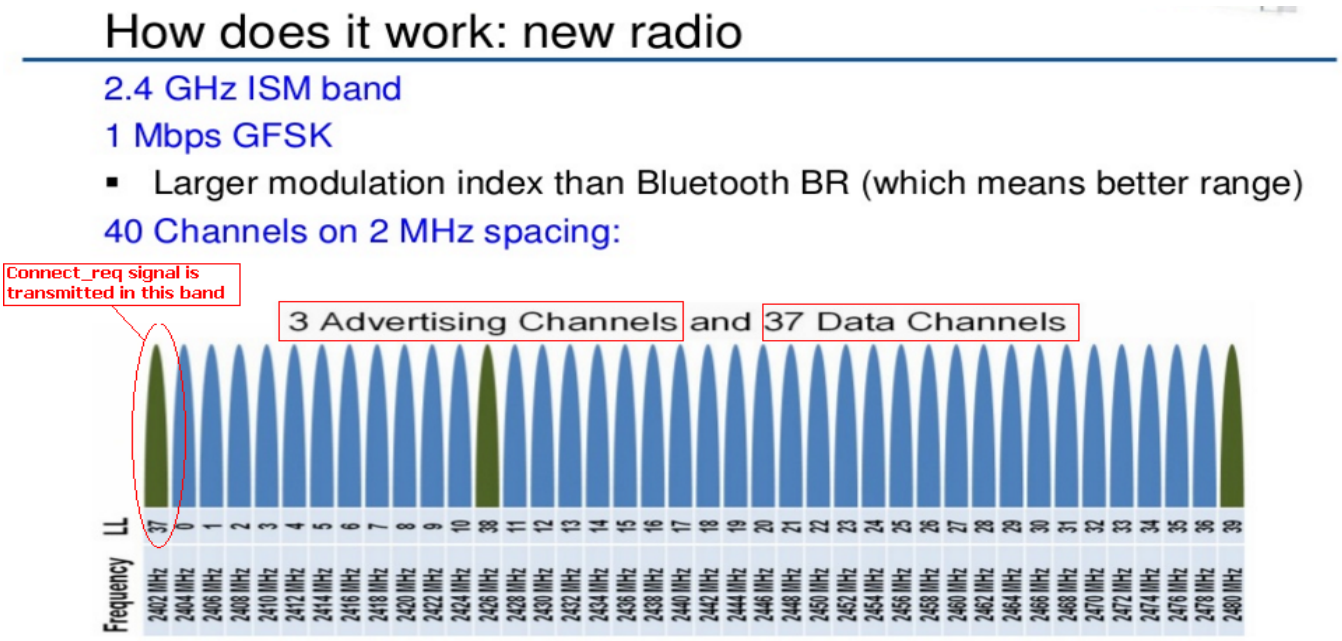
Like the BR/EDR radio, the LE radio operates in the unlicensed 2.4 GHz ISM band. The LE system employs a frequency hopping transceiver to combat interference and fading and provides many FHSS carriers. LE radio operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The symbol rate is 1 Megasymbol per second (Ms/s) supporting the bit rate of 1 Megabit per second (Mb/s).

LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.

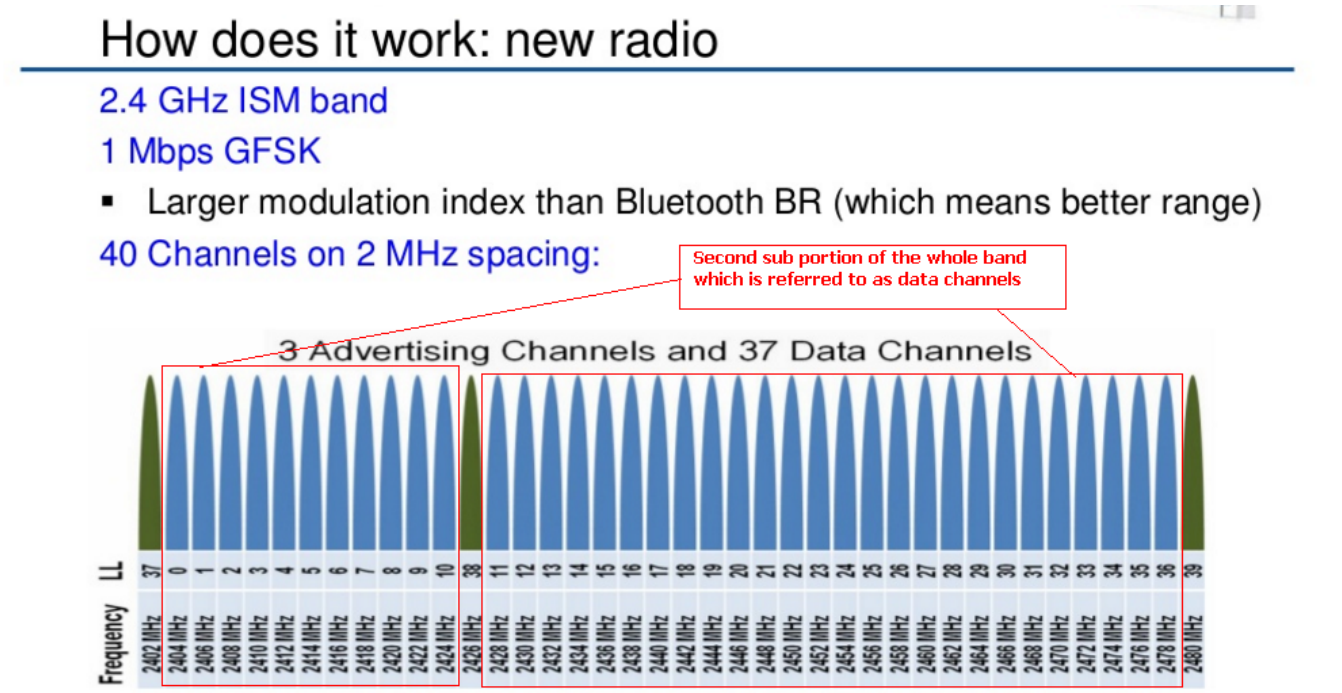
(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)

21. Based on current information and belief, the wireless system comprises a first mobile station (e.g., the accused product) and a second mobile station (e.g., phone, tablet, or

other mobile device). Both are meant to communicate with each other via the Bluetooth v4.0 protocol.

22. Based on current information and belief, the accused product is configured to select a first portion of a radio frequency (RF) band (2.4 GHz-2.4835 GHz of ISM Band) to carry communications (via Bluetooth V4.0 protocol) between the accused product and the second mobile station(e.g., phone, tablet, or other mobile device).

1.4 PHYSICAL CHANNEL

As specified in Part A, Section 2, 40 RF Channels are defined in the 2.4GHz ISM band. These RF Channels are allocated into two LE physical channels: advertising and data. The advertising physical channel uses three RF channels for discovering devices, initiating a connection and broadcasting data. The data physical channel uses up to 37 (see Section 4.5.8) RF channels for communication between connected devices. Each of these RF Channels is allocated a unique channel index (see Section 1.4.1).

(Bluetooth V4.0 Spec)

23. Based on current information and belief, the accused product transmits a first request signal (Connect_Req signal) on a first sub-portion (e.g., double sided spectrum with centre frequency 2.402 GHz, also indexed as channel 37, which is an advertising channel) of the first portion(2.4 GHz-2.4835 GHz) of the RF band directly to the second mobile station(e.g., phone, tablet, portable speaker, headphones or any mobile device) to request communications between the first mobile station(e.g., the accused product) and the second mobile station (e.g., phone, tablet, portable speaker, headphones or any mobile device). The connection request signal is an advertising channel PDU with PDU bit type 0101, the advertising channel PDU is sent over advertising channel (first sub portion). Below is the packet structure of request signal sent by first mobile station (e.g., accused product) to second mobile station.

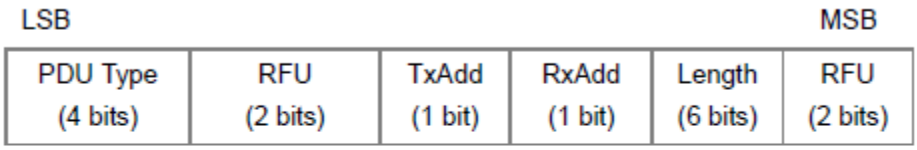
2.3 ADVERTISING CHANNEL PDU

The advertising channel PDU has a 16-bit header and a variable size payload. Its format is as shown in Figure 2.2. The 16 bit Header field of the advertising channel PDU is as shown in Figure 2.3.

LSB MSB

Header (16 bits)	Payload (as per the Length field in the Header)

(Bluetooth V4.0 Spec)



LSB					MSB
PDU Type (4 bits)	RFU (2 bits)	TxAdd (1 bit)	RxAdd (1 bit)	Length (6 bits)	RFU (2 bits)

Figure 2.3: Advertising channel PDU Header

The PDU Type field of the advertising channel PDU that is contained in the header indicates the PDU type as defined in Table 2.1.

(Bluetooth V4.0 Spec)

PDU Type $b_3b_2b_1b_0$	Packet Name
0000	ADV_IND
0001	ADV_DIRECT_IND
0010	ADV_NONCONN_IND
0011	SCAN_REQ
0100	SCAN_RSP
0101	CONNECT_REQ
0110	ADV_SCAN_IND
0111-1111	Reserved

Table 2.1: Advertising channel PDU Header's PDU Type field encoding

(Bluetooth V4.0 Spec)

2.3.3 Initiating PDUs

The following advertising channel PDU Type is called the initiating PDU:

- CONNECT_REQ

This PDU is sent by the Link Layer in the Initiating State and received by the Link Layer in the Advertising State.

2.3.3.1 CONNECT_REQ

The CONNECT_REQ PDU has the Payload as shown in Figure 2.10. TxAdd in the Flags field indicates whether the initiator's device address in the InitA field is public (TxAdd = 0) or random (TxAdd = 1). The RxAdd in the Flags field indicates whether the advertiser's device address in the AdvA field is public (RxAdd = 0) or random (RxAdd = 1).

Payload		
InitA (6 octets)	AdvA (6 octets)	LLData (22 octets)

Figure 2.10: CONNECT_REQ PDU payload

The format of the LLData field is shown in Figure 2.11.

(Bluetooth V4.0 Spec)

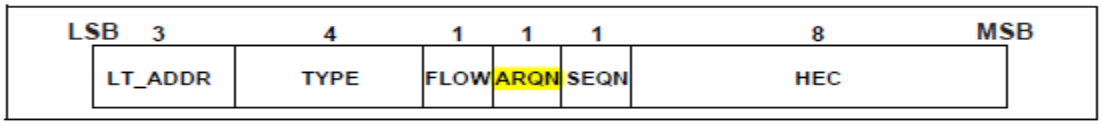
24. Based on current information and belief, the accused product establishes in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band(2.4 GHz-2.4835 GHz of ISM band) and start exchanging data packets of the format shown below.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



(Bluetooth V4.0 Spec)

2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

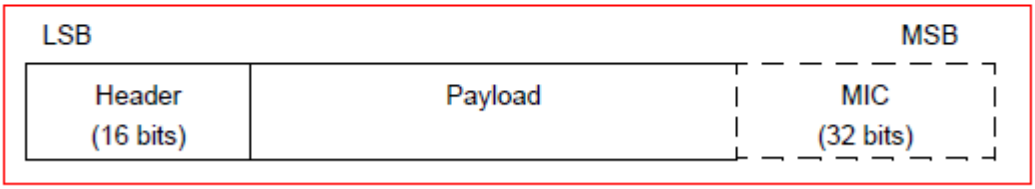
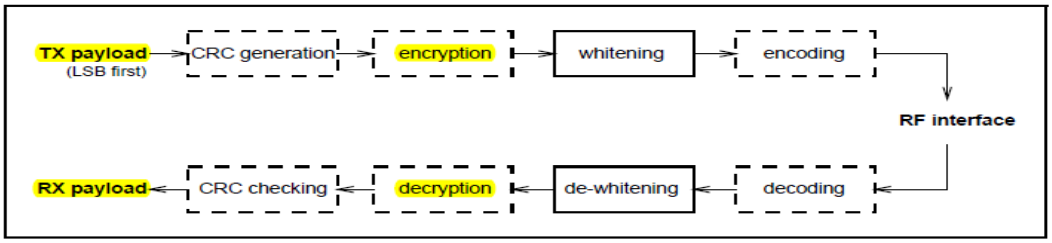


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

25. Based on current information and belief, the accused product encrypts the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey (common key), wherein the message exchanged between the accused product and the second mobile stations are encrypted using the Ckey (common key) In a public private key system a receiver receives an encrypted message and decrypts the same with a private key.



(Bluetooth V4.0 Spec)

Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.
Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.

(Bluetooth V4.0 Spec)

A private key is used to decrypt the encrypted message.

Term	Definition
DHKey	Diffie Hellman key
Ex	Check value from device X
f1( )	Used to generate the 128-bit commitment values Ca and Cb
f2( )	Used to compute the link key and possible other keys from the DHKey and random nonces
f3( )	Used to compute check values Ea and Eb in Authentication Stage 2
g( )	Used to compute numeric check values
h2( )	Used to compute Generic AMP and Dedicated AMP keys
IOcapA	IO capabilities of device A
IOcapB	IO capabilities of device B
LK	Link Key
Nx	Nonce (unique random value) from device X
Nxi	i^{th} nonce (unique random value) from device X. Only used in the passkey entry protocol
PKx	Public Key of device X
rx	Random value generated by device X
rxi	Bit i of the random value rx. Only used in the passkey entry protocol
SKx	Secret (Private) Key of device X
Vx	Confirmation value on device X. Only used in the numeric compare protocol.
X	BD_ADDR of device X

(Bluetooth V4.0 Spec)

When in Simple Pairing debug mode, the Link Manager shall use the following Diffie Hellman private / public key pair:

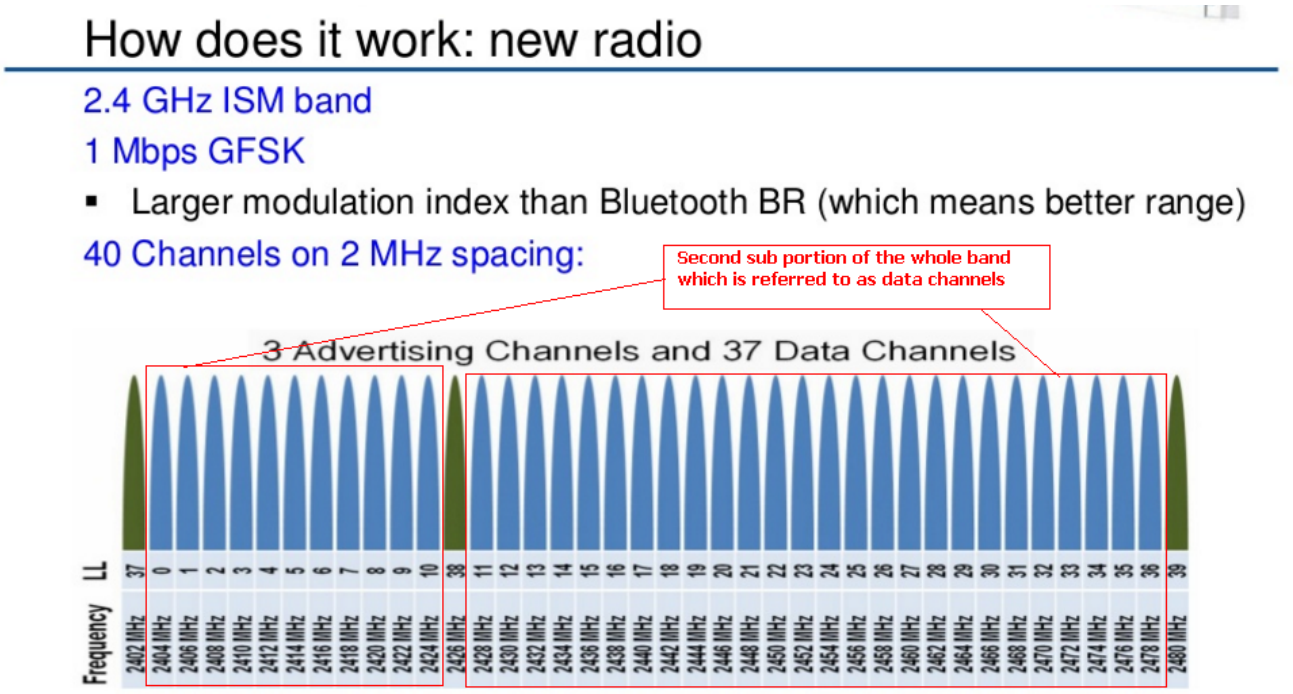
- Private key: 07915f86918ddc27005df1d6cf0c142b625ed2eff4a518ff
- Public key (X): 152070099844 21a6586f9fc3fe7e4329d2809ea51125f8ed
- Public key (Y): b09d42b81bc5bd009f79e4b59dbbaa857fca856fb9f7ea25

(Bluetooth V4.0 Spec)

The lifetime of a temporary link key is limited by the lifetime of the current session – it shall not be reused in a later session. Typically, in a point-to-multipoint configuration where the same information is to be distributed securely to several recipients, a common encryption key is useful. To achieve this, a special link key (denoted master key) may temporarily replace the current link keys. The details of this procedure are found in Section 3.2.6 on page 1069.

(Bluetooth V4.0 Spec)

26. Based on current information and the belief, the second mobile station transmits a first acknowledgement signal after receiving the first request signal Connect_Req signal).Thereafter, the accused product directly receives a first acknowledge signal on a second sub-portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) of the first portion of the RF band (2.4 GHz-2.4835 GHz of ISM band) to acknowledge the first request signal (Connect_Req signal). The second sub portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) is used to receive the acknowledgement signal.



The connectable directed advertising event type allows an initiator to respond with a connect request. An initiator may send a connect request (CONNECT_REQ PDU) to request the Link Layer to enter the Connection State.

(Bluetooth V4.0 Spec)

As is mentioned below, Bluetooth uses an acknowledgment scheme in which for every packet received, an acknowledgement signal is sent to the source.

Bluetooth uses a fast, unnumbered acknowledgment scheme. An ACK (ARQN=1) or a NAK (ARQN=0) is returned in response to the receipt of previously received packet. The slave shall respond in the slave-to-master slot directly following the master-to-slave slot unless the slave has scatternet commitments in that timeslot; the master shall respond at the next event addressing the same slave (the master may have addressed other slaves between the last received packet from the considered slave and the master response to this packet). For a packet reception to be successful, at least the HEC must pass. In addition, the CRC must pass if present.

The BR/EDR Baseband, LE Link Layer, and AMP MAC layers provides the basic acknowledgement/repeat request (ARQ) protocol in Bluetooth. The L2CAP layer can optionally provide a further error detection and retransmission to the L2CAP PDUs. This feature is recommended for applications with requirements for a low probability of undetected errors in the user data. A further optional feature of L2CAP is a window-based flow control that can be used to manage buffer allocation in the receiving device. Both of these optional features augment the QoS performance in certain scenarios. Not all of the L2CAP capabilities are available when using the LE system.

6.4.4 ARQN

The 1-bit acknowledgment indication ARQN is used to inform the source of a successful transfer of payload data with CRC, and can be positive acknowledge ACK or negative acknowledge NAK. See Section 7.6 on page 141 for initialization and usage of this bit.

2.1.2.4 Link Controller

The link controller is responsible for the encoding and decoding of Bluetooth packets from the data payload and parameters related to the physical channel, logical transport and logical link.

The link controller carries out the link control protocol signaling in BR/EDR and link layer protocol in LE (in close conjunction with the scheduling function of the resource manager), which is used to communicate flow control and acknowledgement and retransmission request signals. The interpretation of these signals is a characteristic of the logical transport associated with the baseband packet. Interpretation and control of the link control signaling is normally associated with the resource manager's scheduler.

(Bluetooth V4.0 Spec)

Once the second mobile station receives connect_req signal it enters into the connection state where it transmits data on data channels (second sub portion of band formed of frequencies ranging from : 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz).

4.5 CONNECTION STATE

The Link Layer enters the Connection State when an initiator sends a CONNECT_REQ PDU to an advertiser or an advertiser receives a CONNECT_REQ PDU from an initiator.

(Bluetooth V4.0 Spec)

Therefore the second mobile station sends an acknowledgement signal to the first mobile station after receiving connect_req. Since after receipt the connect_req by second mobile station the stations enters connection state mode, where all the signals are sent over data channel and the acknowledgement is sent over the data channels.

4.5.1 Connection Events

The Link Layer in the Connection State shall only transmit Data Channel PDUs (see Section 2.4) in connection events. The master and slave shall determine the data channel index for each connection event as defined in Section 4.5.8. The same data channel index shall be used for all packets in the connection event. Each connection event contains at least one packet sent by the master.

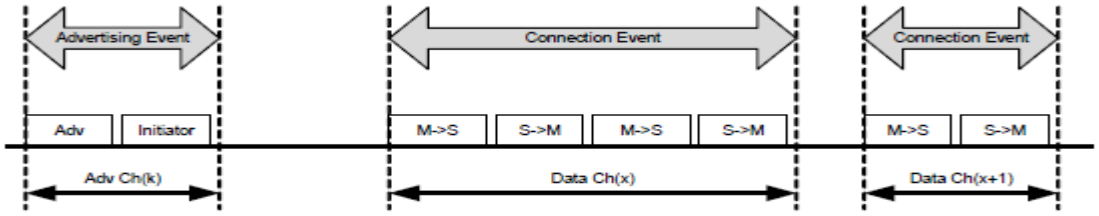
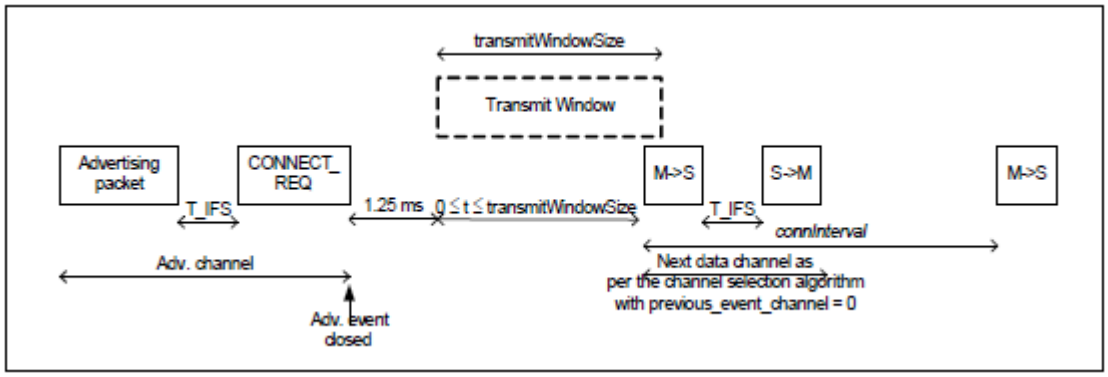


Figure 1.4: Connection Events



(Bluetooth V4.0 Spec)

Below is the packet structure of a packet sent over data channels.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
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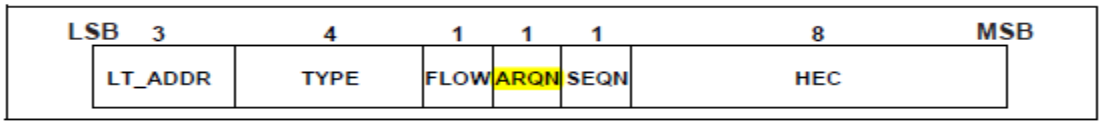

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The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

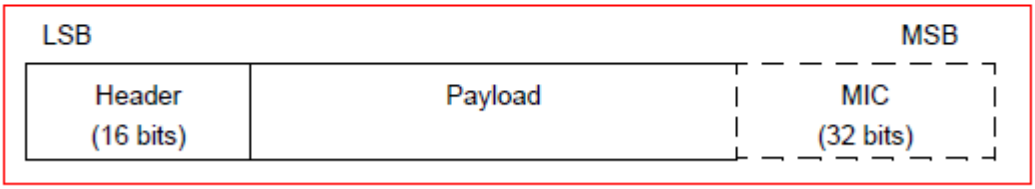


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

27. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

28. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

29. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

30. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 6,321,095 (TomTom Adventurer Cardio + Music GPS Heart Rate Monitor Watch)

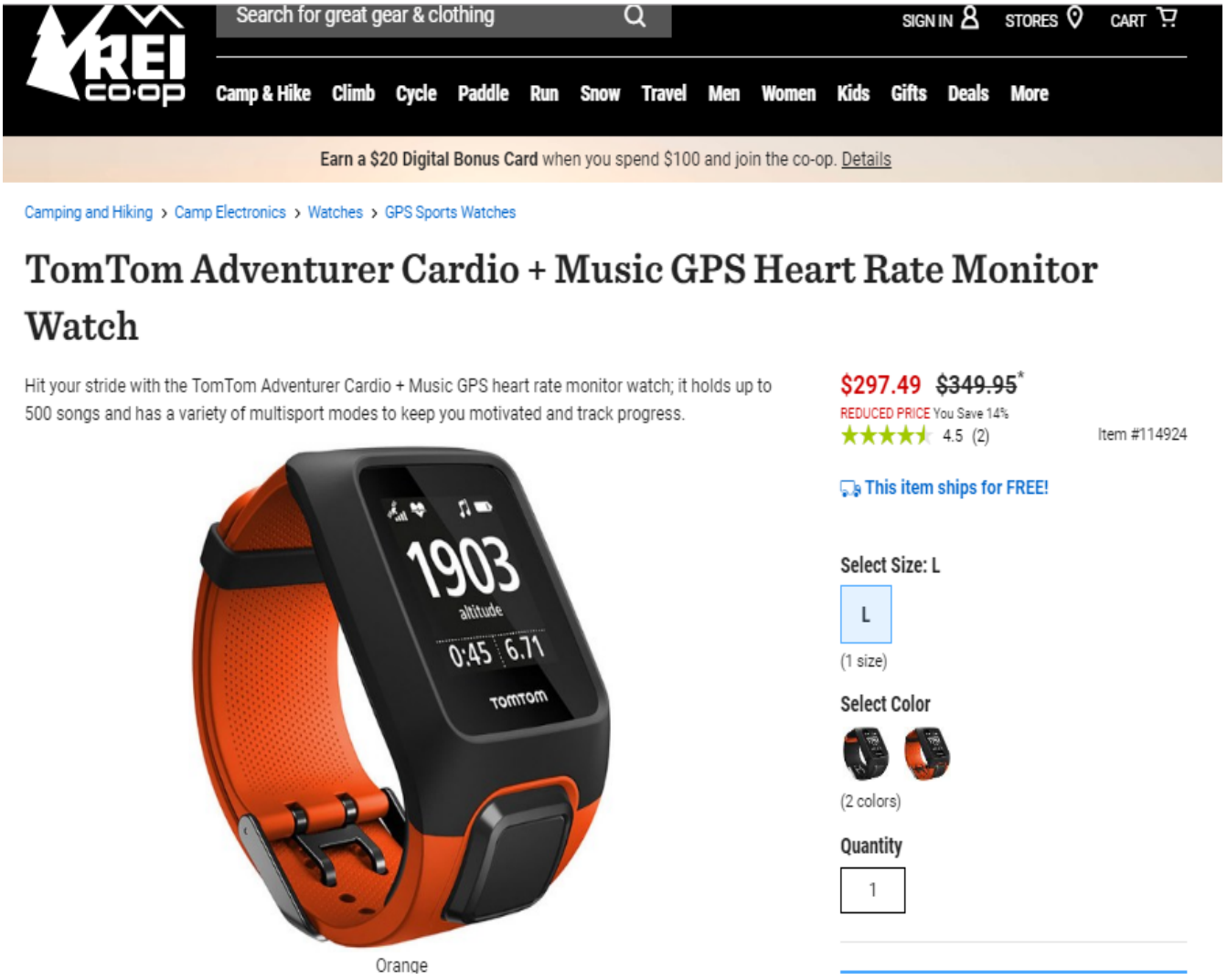
31. Plaintiff is the owner of United States Patent No. 6,321,095 ("the '095 patent") entitled "Wireless Communications Approach." The '095 Patent issued on November 20, 2001. A true and correct copy of the '095 Patent is attached as Exhibit A.

32. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '095 patent. The '095 patent provides, among other things, " A wireless communication system comprising: a first mobile station; and a second mobile station; wherein the first mobile station is configured to select a first portion of a radio frequency (RF) band to carry communications between the first mobile station and the second mobile station, transmit a first request signal on a first sub-portion of the first portion of the RF band directly to the second mobile station to request communications between the first mobile station and the second mobile station, establish in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band; encrypt the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey, wherein the message exchanged between the first and the second mobile stations are encrypted using the Ckey; and Wherein the second mobile station is configured to transmit, in response to receiving the first request signal from the first mobile station, the first acknowledge signal on a second sub-portion of the first portion of the RF band directly to the first mobile station to acknowledge the first request signal."

33. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services that infringed one or more claims of the '095 patent, including at least Claim 7, in this district

and elsewhere in the United States. The TomTom Adventurer Cardio + Music GPS Heart Rate Monitor Watch ("the accused product") forms a wireless communication system along with another mobile station (e.g., phone tablet, or other mobile device). By making, using, importing, offering for sale, and/or selling such products and services, and all like products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '095 patent pursuant to 35 U.S.C. § 271.

34. Based on current information and belief, the accused product, which is a mobile station, forms a wireless communication system along with another mobile station (e.g., phone, tablet, or other mobile device). The communication protocol employed by the accused product to form the wireless communication system is Bluetooth V4.0 low energy. The wireless communication link is initiated by a companion application installed on the mobile station (e.g. phone or tablet) connected to the accused product.



(https://www.rei.com/product/114924/tomtom-adventurer-cardio-music-gps-heart-rate-monitor-watch)

TOMTOM PRODUCTS UPDATES SUPPORT BUSINESS

Thickness	11.5 mm
Thickness	13.7 mm
Weight	55 g
Wrist Size	130 - 206 mm

Location

Location	GPS
QuickGPSFix	Yes

Sensors

Sensors (internal)	Motion sensors (accelerometer + gyro), barometer, compass, optical heart rate monitor
Sensor (wireless)	Bluetooth® Smart
Alerts	Beep & Vibrate

(https://www.tomtom.com/en_in/sports/outdoor-watches/gps-outdoor-watch-adventurer/orange/)

WHAT IS BLE (BLUETOOTH SMART)?

Bluetooth® Smart, or BLE, is the intelligent, power-friendly version of Bluetooth wireless technology. While the power-efficiency of Bluetooth Smart makes it perfect for devices needing to run off a tiny battery for long periods, the magic of Bluetooth Smart is its ability to work with an application on the smartphone or tablet you already own. Bluetooth Smart makes it easy for developers and OEMs to create solutions that will work with the billions of Bluetooth enabled products already in the market today.[1]

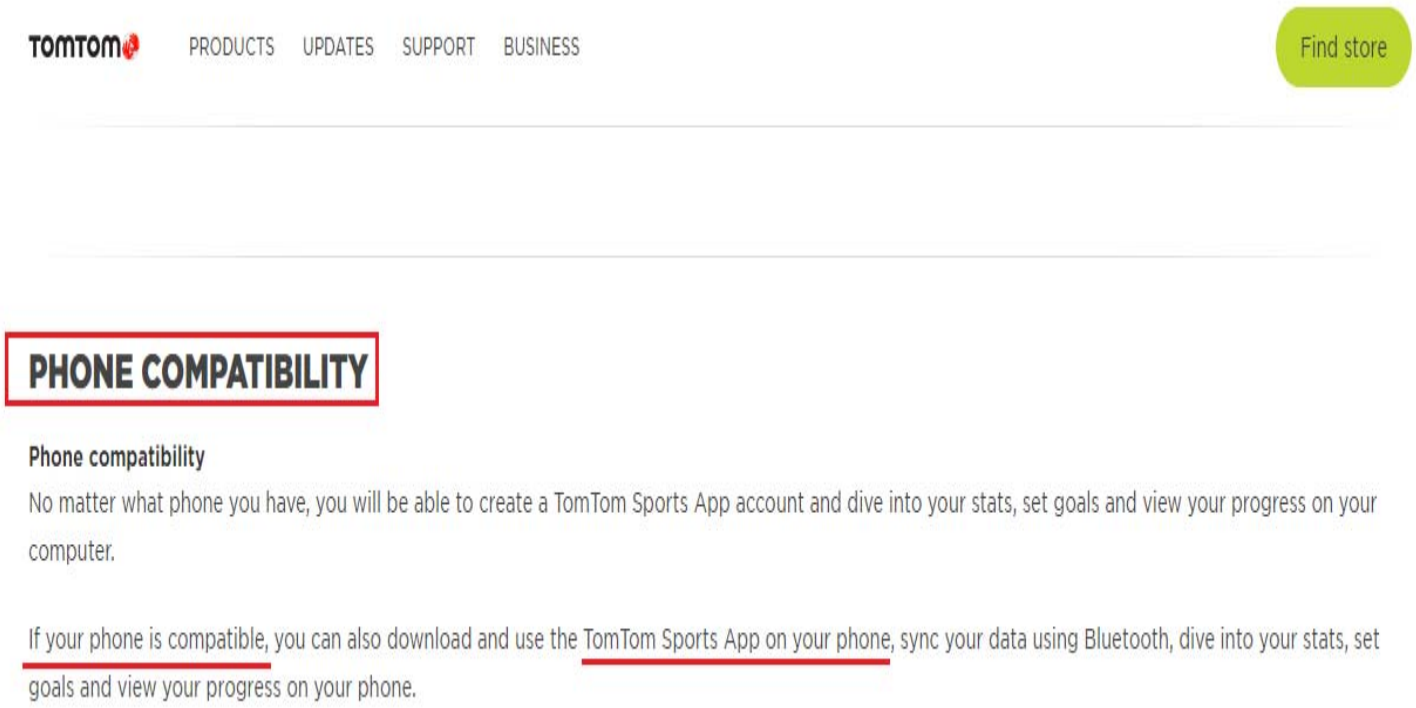
Bluetooth -- *Simplified*

Bluetooth Smart, (also known as LE, BLE, Bluetooth 4.0, or Bluetooth Low Energy), is an intelligent, battery-friendly, version of the Classic Bluetooth Wireless Technology.

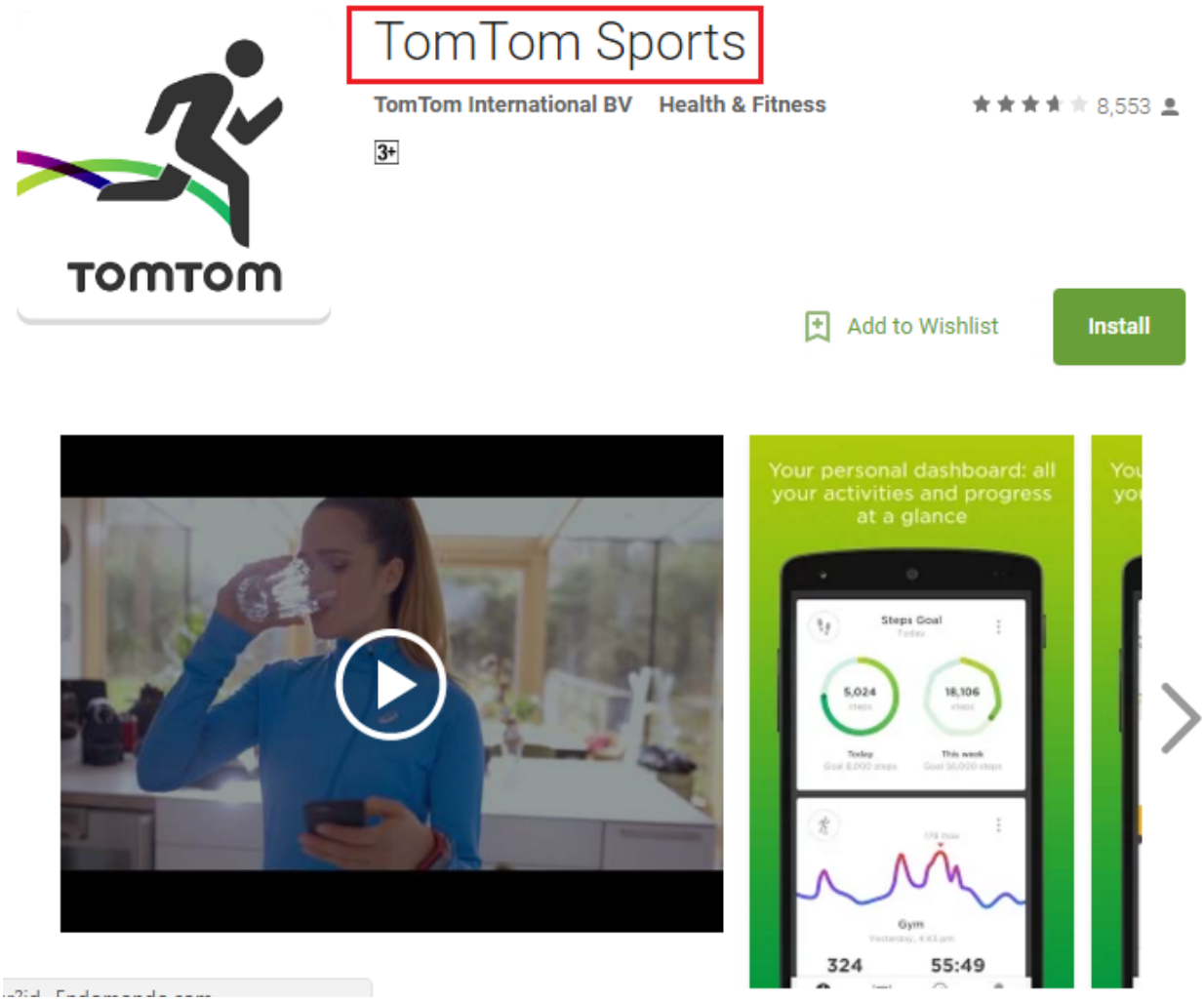
While the use of Classic Bluetooth still remains the best option for some applications, there are many applications in which Bluetooth Smart would be the wisest choice. A few of these benefits:

Lower implementation costs
Multi-vendor interoperability
Enhanced range
Much improved pairing speed

(https://serialio.com/news/what-ble-bluetooth-smart)



(https://www.tomtom.com/en_in/sports/outdoor-watches/gps-outdoor-watch-adventurer/orange/)



(https://play.google.com/store/apps/details?id=com.tomtom.Sports&hl=en)

Bluetooth	Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.

1.1.1 Bluetooth Compliance Requirements

Rev	Date	Comments
4.0	June 30 2010	Updated to support Low Energy, ATT, and GATT support for BR/EDR, and to enable High Speed Controller Subsystems.
3.0 + HS	April 21 2009	Updated to include support for the Alternative MAC/PHY feature and High Speed Core Configuration.
v2.1 + EDR	July 26 2007	No content changes. Updates to the Table of Contents.
v2.0 + EDR	Oct 15 2004	This version of the specification is intended to be a separate Bluetooth Specification that has all the functional characteristics of the v1.2 Bluetooth Specification that adds the Enhanced Data Rate (EDR) feature which required changes to Volume 0, Part A, Master Table of Contents.
v1.2	Nov 05 2003	This Part was moved from the Core volume. No content changes been made to this document since v1.1.

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, ... ,39

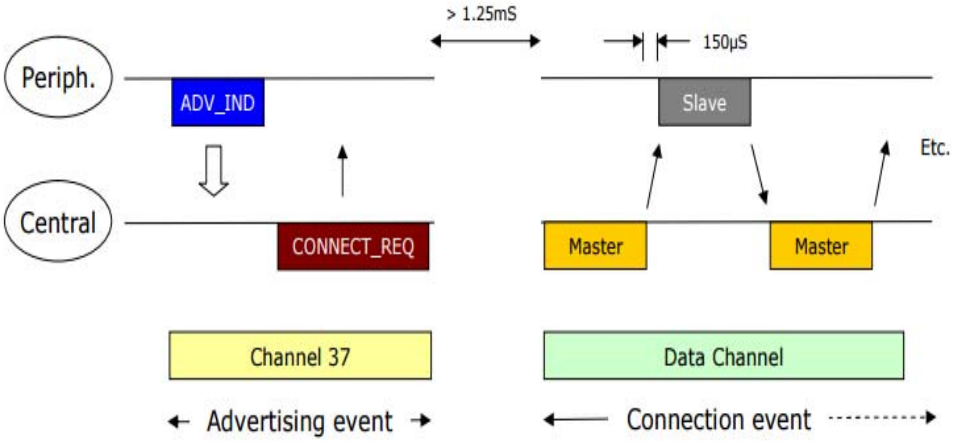
Table 2.1: Operating frequency bands

1.2 OVERVIEW OF BLUETOOTH LOW ENERGY OPERATION

Like the BR/EDR radio, the LE radio operates in the unlicensed 2.4 GHz ISM band. The LE system employs a frequency hopping transceiver to combat interference and fading and provides many FHSS carriers. LE radio operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The symbol rate is 1 Megasymbol per second (Ms/s) supporting the bit rate of 1 Megabit per second (Mb/s).

LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.

How does it work: data transactions



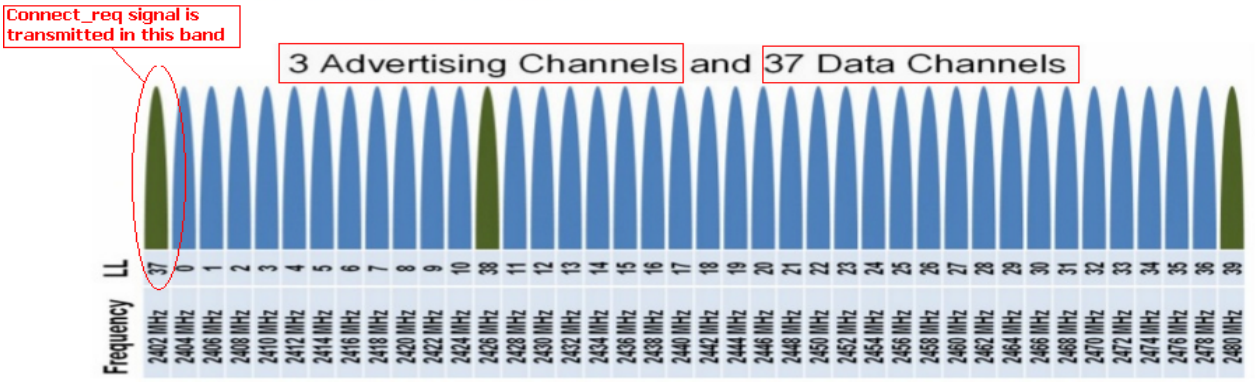
How does it work: new radio

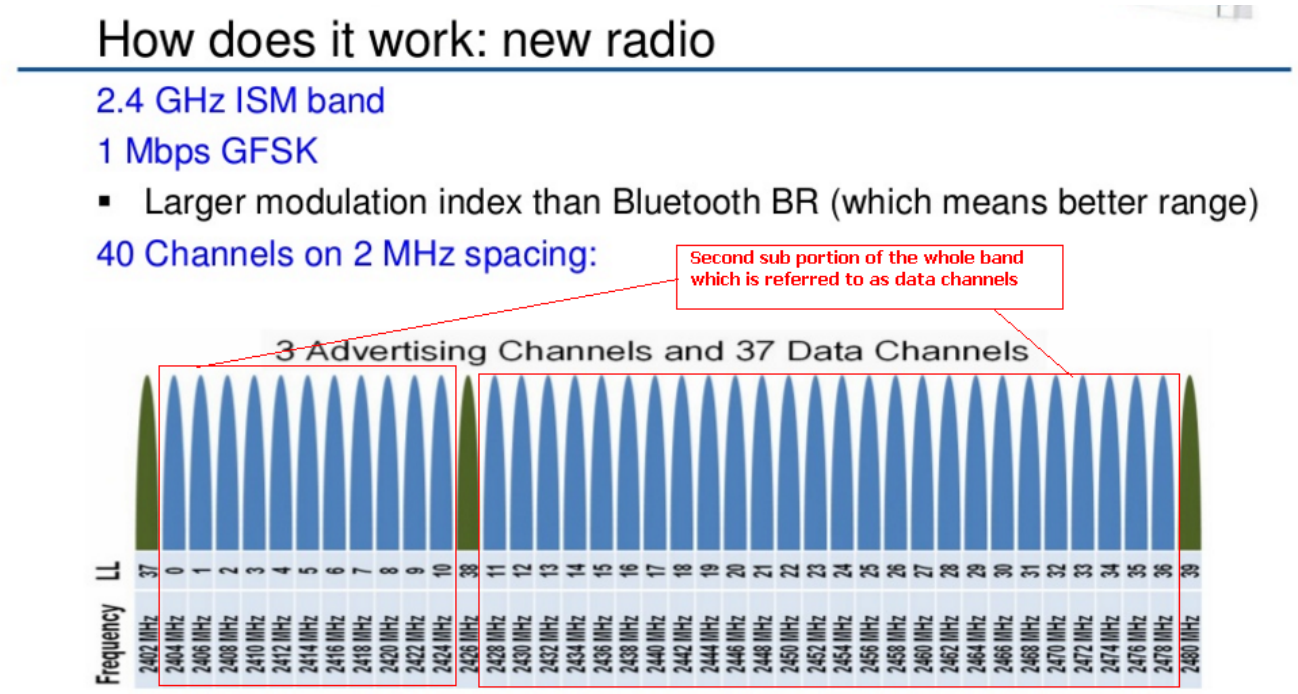
2.4 GHz ISM band

1 Mbps GFSK

- Larger modulation index than Bluetooth BR (which means better range)

40 Channels on 2 MHz spacing:





(Bluetooth V4.0 Spec)

35. Based on current information and belief, the wireless system comprises a first mobile station (e.g., the accused product) and a second mobile station (e.g., phone, tablet, or other mobile device). Both are meant to communicate with each other via the Bluetooth v4.0 protocol.

36. Based on current information and belief, the accused product is configured to select a first portion of a radio frequency (RF) band (2.4 GHz-2.4835 GHz of ISM Band) to carry communications (via Bluetooth V4.0 protocol) between the accused product and the second mobile station(e.g., phone, tablet, or other mobile device).

1.4 PHYSICAL CHANNEL

As specified in Part A, Section 2, 40 RF Channels are defined in the 2.4GHz ISM band. These RF Channels are allocated into two LE physical channels: advertising and data. The advertising physical channel uses three RF channels for discovering devices, initiating a connection and broadcasting data. The data physical channel uses up to 37 (see Section 4.5.8) RF channels for communication between connected devices. Each of these RF Channels is allocated a unique channel index (see Section 1.4.1).

(Bluetooth V4.0 Spec)

37. Based on current information and belief, The accused product transmits a first request signal (Connect_Req signal) on a first sub-portion (e.g., double sided spectrum with centre frequency 2.402 GHz, also indexed as channel 37, which is an advertising channel) of the first portion(2.4 GHz-2.4835 GHz) of the RF band directly to the second mobile station(e.g., phone, tablet, portable speaker, headphones or any mobile device) to request communications between the first mobile station(e.g., the accused product) and the second mobile station (e.g., phone, tablet, portable speaker, headphones or any mobile device).

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

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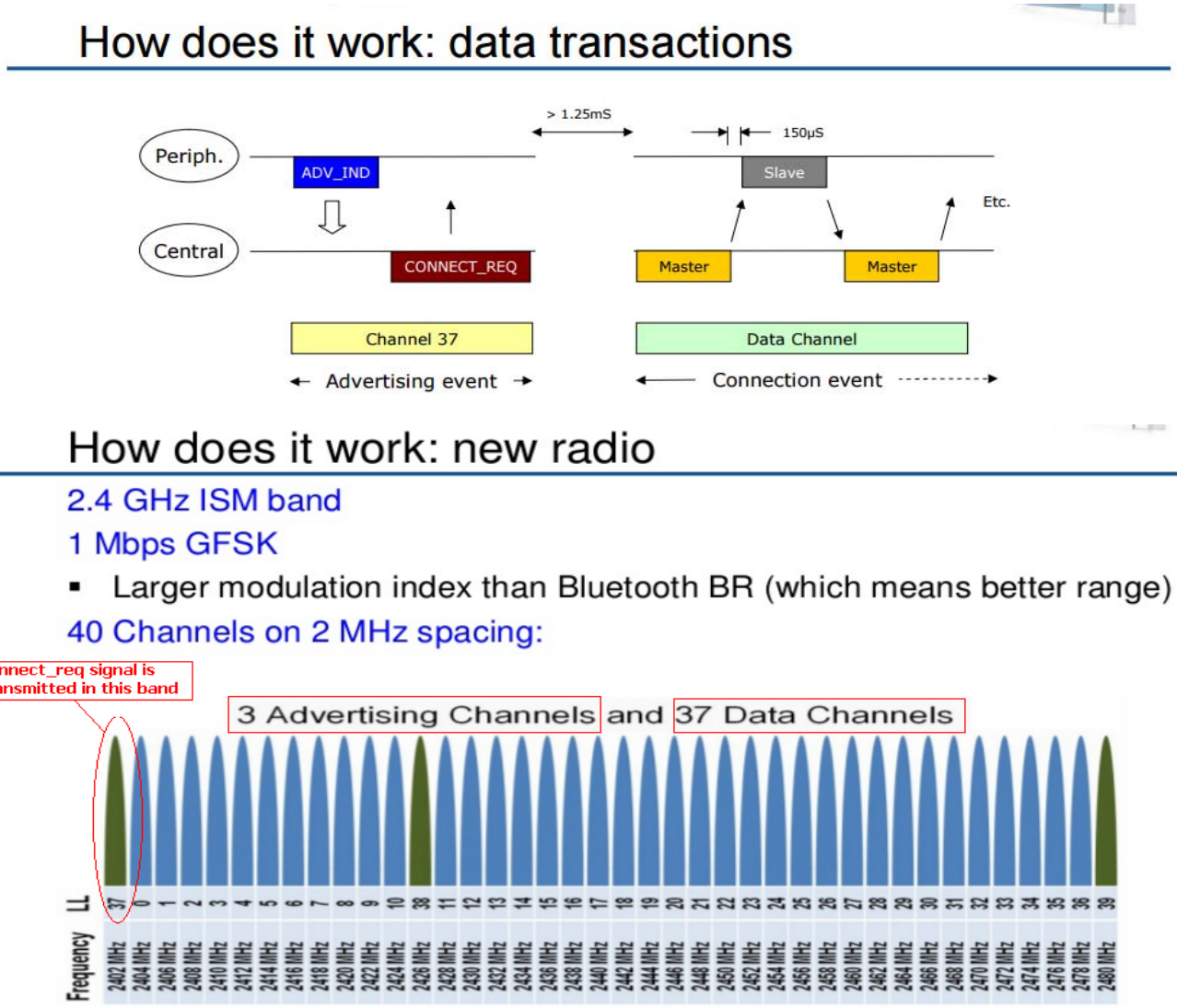
LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.



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(Bluetooth V4.0 Spec)

The connection request signal is an advertising channel PDU with PDU bit type 0101, the advertising channel PDU is sent over advertising channel (first sub portion). Below is the packet

structure of request signal sent by first mobile station (e.g., accused product) to second mobile station.

2.3 ADVERTISING CHANNEL PDU

The advertising channel PDU has a 16-bit header and a variable size payload. Its format is as shown in Figure 2.2. The 16 bit Header field of the advertising channel PDU is as shown in Figure 2.3.

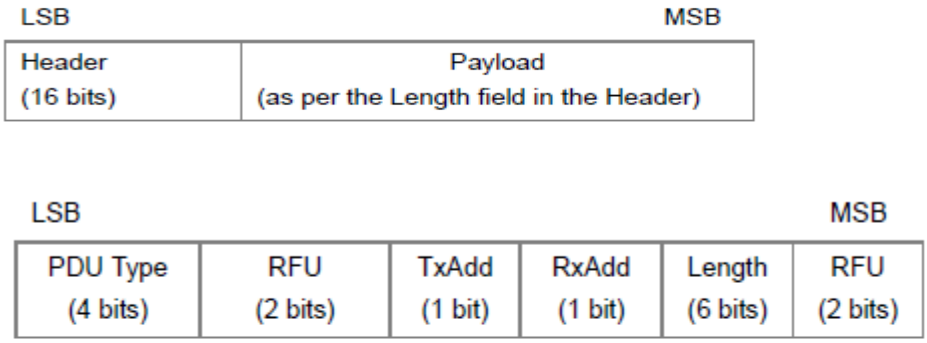


Figure 2.3: Advertising channel PDU Header

The PDU Type field of the advertising channel PDU that is contained in the header indicates the PDU type as defined in Table 2.1.

PDU Type $b_3b_2b_1b_0$	Packet Name
0000	ADV_IND
0001	ADV_DIRECT_IND
0010	ADV_NONCONN_IND
0011	SCAN_REQ
0100	SCAN_RSP
0101	CONNECT_REQ
0110	ADV_SCAN_IND
0111-1111	Reserved

Table 2.1: Advertising channel PDU Header's PDU Type field encoding

2.3.3 Initiating PDUs

The following advertising channel PDU Type is called the initiating PDU:

- CONNECT_REQ

This PDU is sent by the Link Layer in the Initiating State and received by the Link Layer in the Advertising State.

2.3.3.1 CONNECT_REQ

The CONNECT_REQ PDU has the Payload as shown in Figure 2.10. TxAdd in the Flags field indicates whether the initiator's device address in the InitA field is public (TxAdd = 0) or random (TxAdd = 1). The RxAdd in the Flags field indicates whether the advertiser's device address in the AdvA field is public (RxAdd = 0) or random (RxAdd = 1).

Payload		
InitA (6 octets)	AdvA (6 octets)	LLData (22 octets)

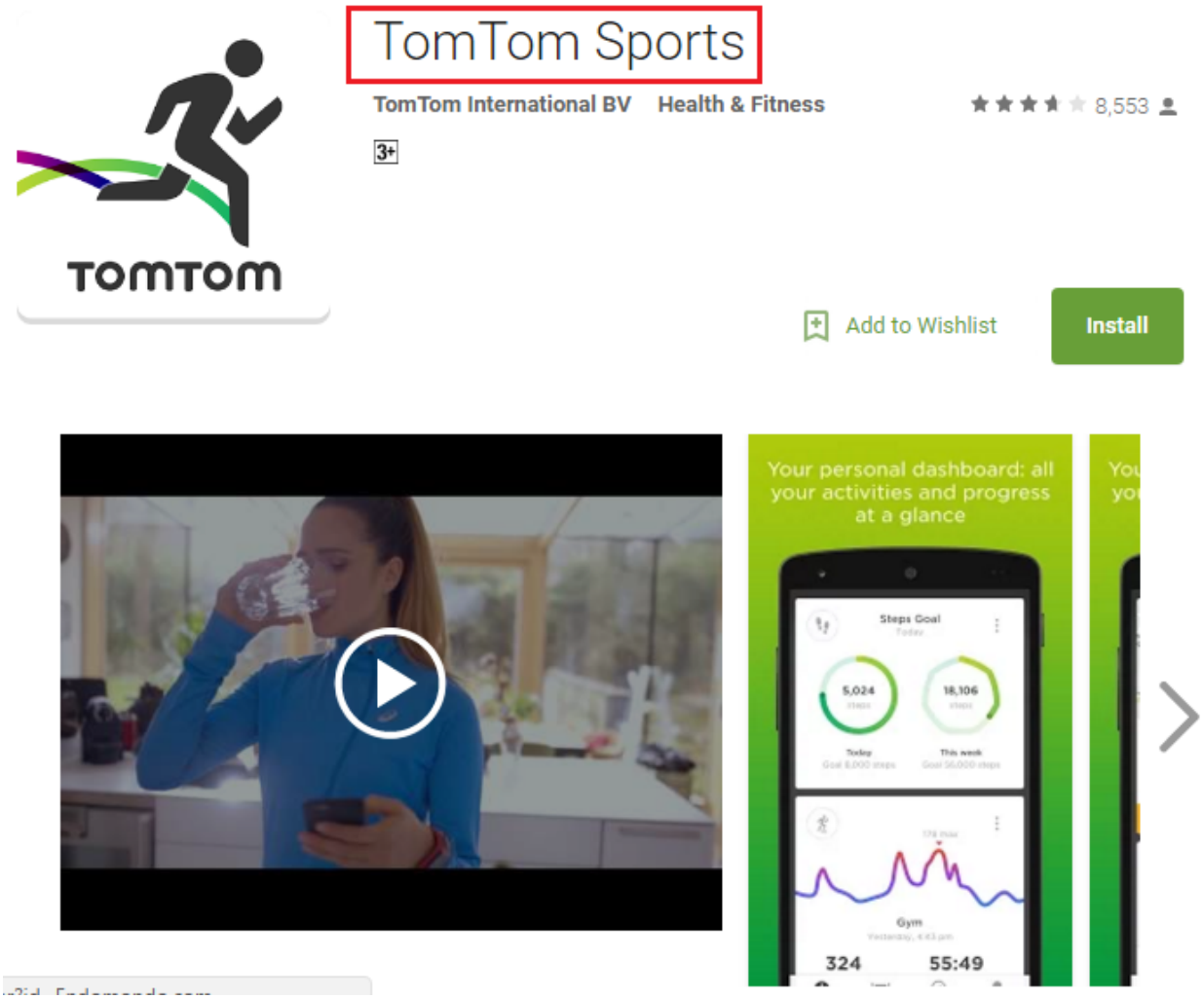
Figure 2.10: CONNECT_REQ PDU payload

The format of the LLData field is shown in Figure 2.11.

(Bluetooth V4.0 Spec)

38. The accused product establishes in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band (2.4 GHz-2.4835 GHz of ISM band) and start exchanging data packets of the format shown below.

(https://play.google.com/store/apps/details?id=com.tomtom.Sports&hl=en)



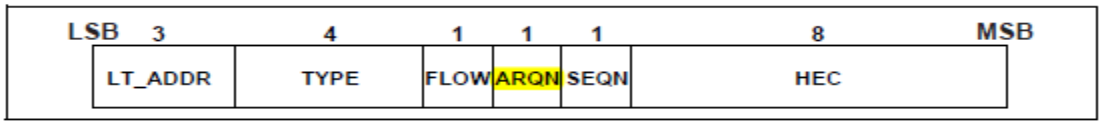
(https://play.google.com/store/apps/details?id=com.tomtom.Sports&hl=en)

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

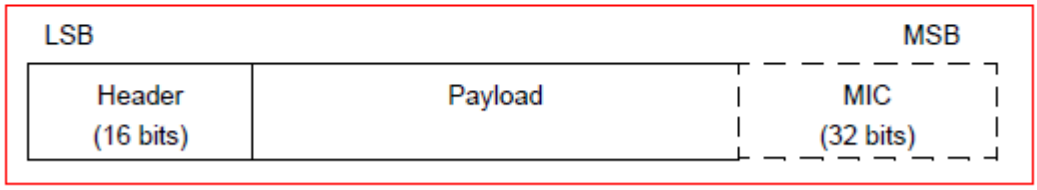
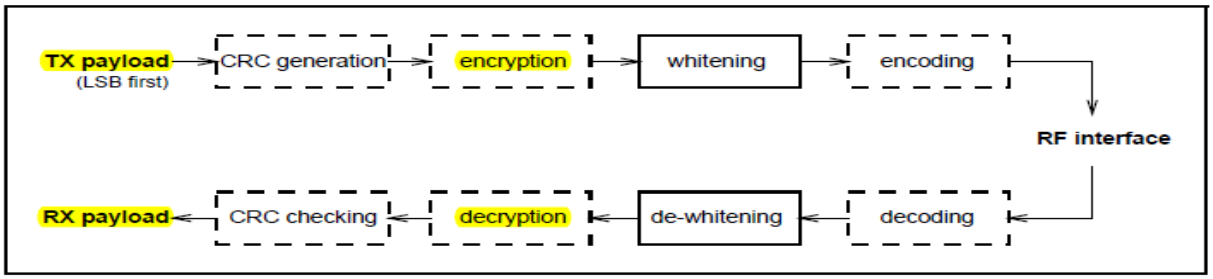


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

39. Based on current information and belief, the accused product encrypts the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey (common key), wherein the message exchanged between the accused product and the second mobile stations are encrypted using the Ckey (common key) In a public private key system a receiver receives an encrypted message and decrypts the same with a private key.



Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.
Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.

(Bluetooth V4.0 Spec)

A private key is used to decrypt the encrypted message.

Term	Definition
DHKey	Diffie Hellman key
Ex	Check value from device X
f1( )	Used to generate the 128-bit commitment values Ca and Cb
f2( )	Used to compute the link key and possible other keys from the DHKey and random nonces
f3( )	Used to compute check values Ea and Eb in Authentication Stage 2
g( )	Used to compute numeric check values
h2( )	Used to compute Generic AMP and Dedicated AMP keys
IOcapA	IO capabilities of device A
IOcapB	IO capabilities of device B
LK	Link Key
Nx	Nonce (unique random value) from device X
Nxi	i^{th} nonce (unique random value) from device X. Only used in the passkey entry protocol
PKx	Public Key of device X
rx	Random value generated by device X
rxi	Bit i of the random value rx. Only used in the passkey entry protocol
SKx	Secret (Private) Key of device X
Vx	Confirmation value on device X. Only used in the numeric compare protocol.
X	BD_ADDR of device X

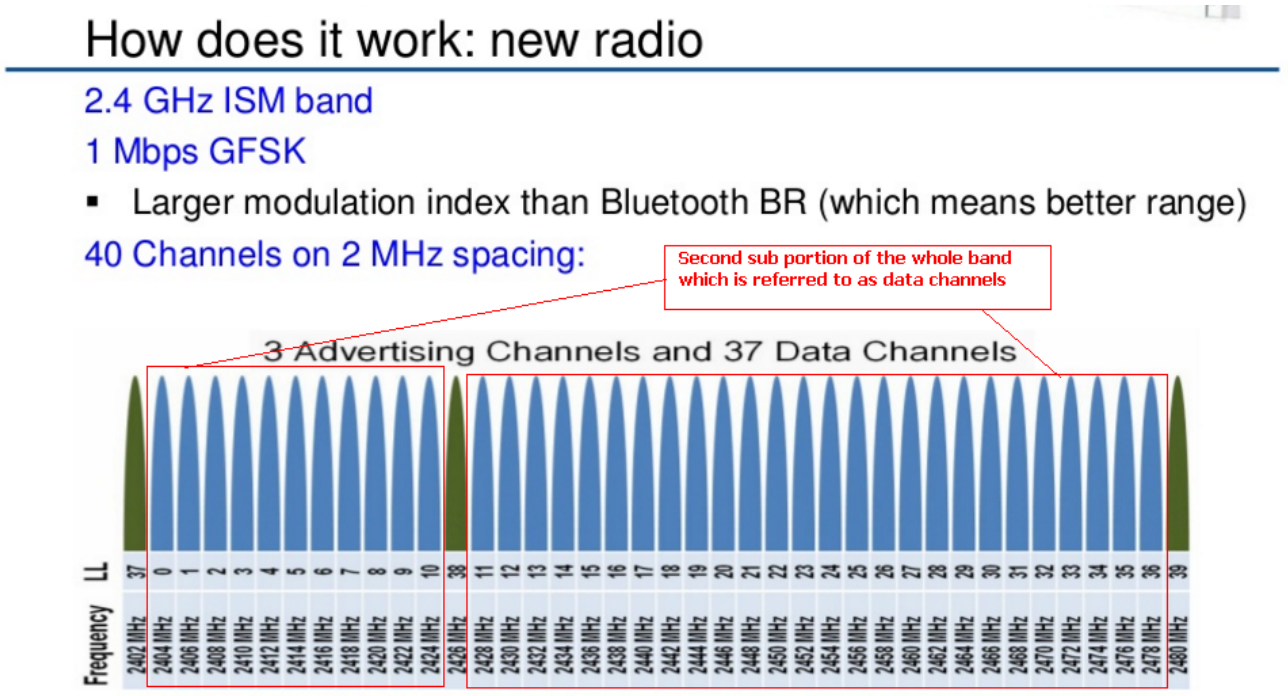
When in Simple Pairing debug mode, the Link Manager shall use the following Diffie Hellman private / public key pair:

- Private key: 07915f86918ddc27005df1d6cf0c142b625ed2eff4a518ff
- Public key (X): 15207009984421a6586f9fc3fe7e4329d2809ea51125f8ed
- Public key (Y): b09d42b81bc5bd009f79e4b59dbbaa857fca856fb9f7ea25

> The lifetime of a temporary link key is limited by the lifetime of the current session – it shall not be reused in a later session. Typically, in a point-to-multipoint configuration where the same information is to be distributed securely to several recipients, a common encryption key is useful. To achieve this, a special link key (denoted master key) may temporarily replace the current link keys. The details of this procedure are found in Section 3.2.6 on page 1069.

(Bluetooth V4.0 Spec)

40. Based on current information and belief, the second mobile station transmits a first acknowledgement signal after receiving the first request signal (Connect_Req signal).Thereafter, the accused product directly receives a first acknowledge signal on a second sub-portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) of the first portion of the RF band (2.4 GHz-2.4835 GHz of ISM band) to acknowledge the first request signal (Connect_Req signal). The second sub portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) is used to receive the acknowledgement signal.



> The connectable directed advertising event type allows an initiator to respond with a connect request. An initiator may send a connect request (CONNECT_REQ PDU) to request the Link Layer to enter the Connection State.

(Bluetooth V4.0 Spec)

As is mentioned below, Bluetooth uses an acknowledgement scheme in which for every packet received, an acknowledgement signal is sent to the source.

> Bluetooth uses a fast, unnumbered acknowledgment scheme. An ACK (ARQN=1) or a NAK (ARQN=0) is returned in response to the receipt of previously received packet. The slave shall respond in the slave-to-master slot directly following the master-to-slave slot unless the slave has scatternet commitments in that timeslot; the master shall respond at the next event addressing the same slave (the master may have addressed other slaves between the last received packet from the considered slave and the master response to this packet). For a packet reception to be successful, at least the HEC must pass. In addition, the CRC must pass if present.

> The BR/EDR Baseband, LE Link Layer, and AMP MAC layers provides the basic acknowledgement/repeat request (ARQ) protocol in Bluetooth. The L2CAP layer can optionally provide a further error detection and retransmission to the L2CAP PDUs. This feature is recommended for applications with requirements for a low probability of undetected errors in the user data. A further optional feature of L2CAP is a window-based flow control that can be used to manage buffer allocation in the receiving device. Both of these optional features augment the QoS performance in certain scenarios. Not all of the L2CAP capabilities are available when using the LE system.

> **6.4.4 ARQN**

> The 1-bit acknowledgment indication ARQN is used to inform the source of a successful transfer of payload data with CRC, and can be positive acknowledge ACK or negative acknowledge NAK. See Section 7.6 on page 141 for initialization and usage of this bit.

2.1.2.4 Link Controller

The link controller is responsible for the encoding and decoding of Bluetooth packets from the data payload and parameters related to the physical channel, logical transport and logical link.

The link controller carries out the link control protocol signaling in BR/EDR and link layer protocol in LE (in close conjunction with the scheduling function of the resource manager), which is used to communicate flow control and acknowledgement and retransmission request signals. The interpretation of these signals is a characteristic of the logical transport associated with the baseband packet. Interpretation and control of the link control signaling is normally associated with the resource manager's scheduler.

(Bluetooth V4.0 Spec)

Once the second mobile station receives connect_req signal it enters into the connection state where it transmits data on data channels (second sub portion of band formed of frequencies ranging from : 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz.

4.5 CONNECTION STATE

The Link Layer enters the Connection State when an initiator sends a CONNECT_REQ PDU to an advertiser or an advertiser receives a CONNECT_REQ PDU from an initiator.

(Bluetooth V4.0 Spec)

Therefore the second mobile station sends an acknowledgement signal to the first mobile station after receiving connect_req. Since after receipt the connect_req by second mobile station the stations enters connection state mode where all the signals are sent over data channel and the acknowledgement is sent over the data channels.

4.5.1 Connection Events

The Link Layer in the Connection State shall only transmit Data Channel PDUs (see Section 2.4) in connection events. The master and slave shall determine the data channel index for each connection event as defined in Section 4.5.8. The same data channel index shall be used for all packets in the connection event. Each connection event contains at least one packet sent by the master.

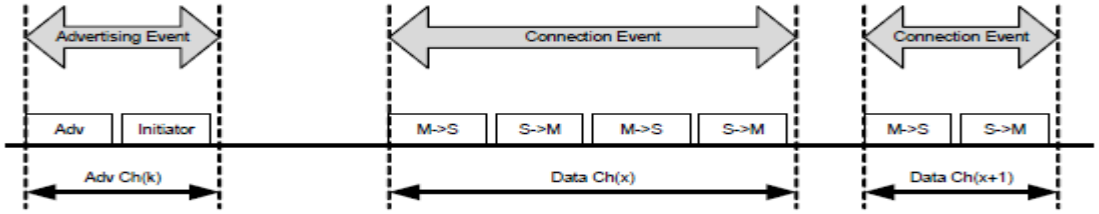
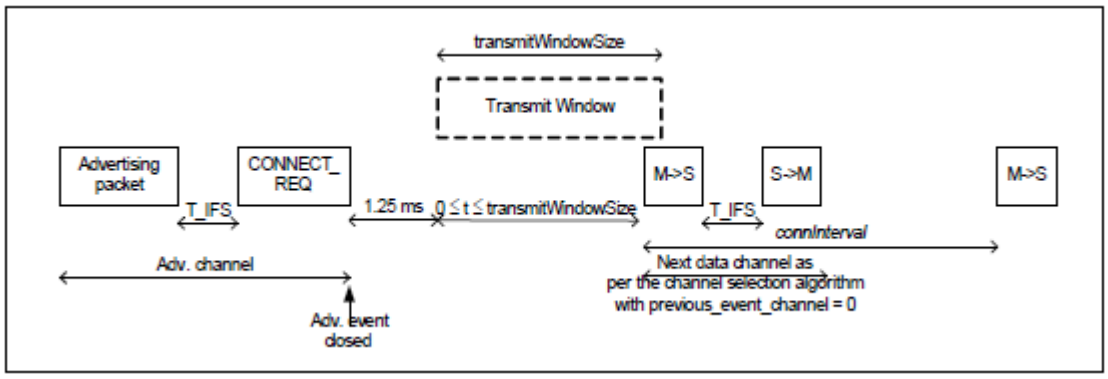


Figure 1.4: Connection Events



(Bluetooth V4.0 Spec)

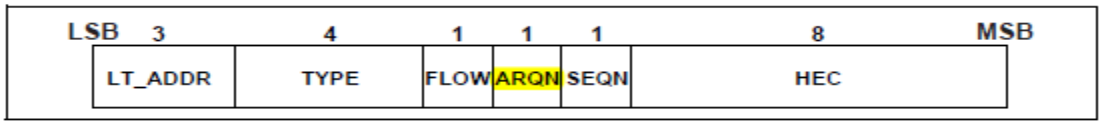
Below is the packet structure of a packet sent over data channels.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



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The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

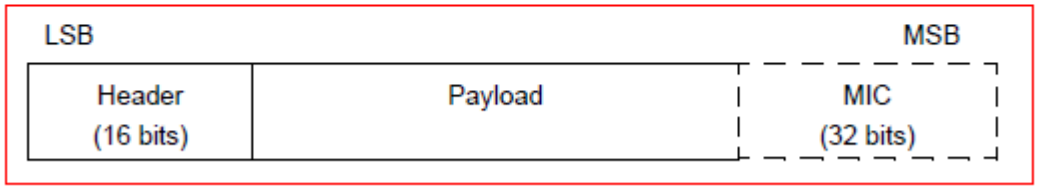


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

41. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

42. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

43. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

44. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT III

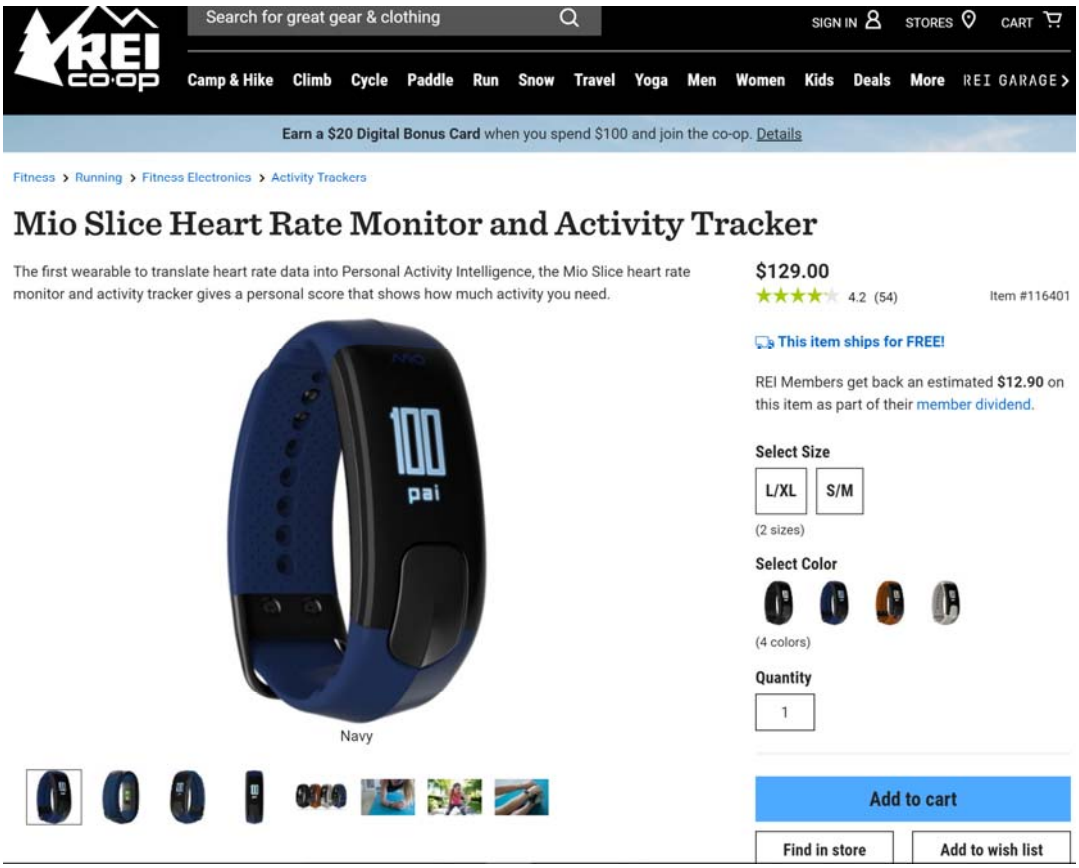
INFRINGEMENT OF U.S. PATENT NO. 6,321,095 (Mio Slice)

45. Plaintiff is the owner of United States Patent No. 6,321,095 ("the '095 patent") entitled "Wireless Communications Approach." The '095 Patent issued on November 20, 2001. A true and correct copy of the '095 Patent is attached as Exhibit A.

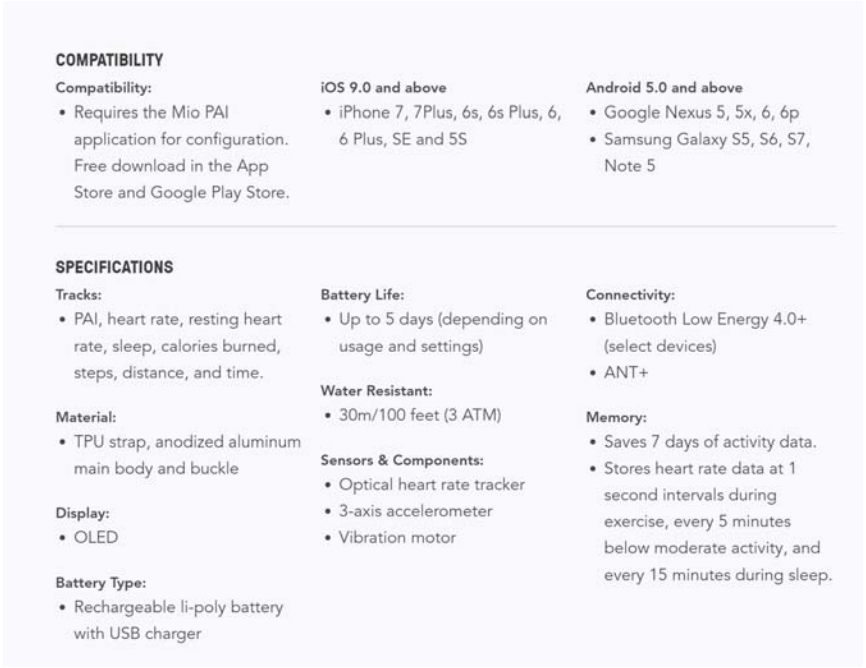
46. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '095 patent. The '095 patent provides, among other things, " A wireless communication system comprising: a first mobile station; and a second mobile station; wherein the first mobile station is configured to select a first portion of a radio frequency (RF) band to carry communications between the first mobile station and the second mobile station, transmit a first request signal on a first sub-portion of the first portion of the RF band directly to the second mobile station to request communications between the first mobile station and the second mobile station, establish in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band; encrypt the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey, wherein the message exchanged between the first and the second mobile stations are encrypted using the Ckey; and Wherein the second mobile station is configured to transmit, in response to receiving the first request signal from the first mobile station, the first acknowledge signal on a second sub-portion of the first portion of the RF band directly to the first mobile station to acknowledge the first request signal."

47. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services that infringed one or more claims of the '095 patent, including at least Claim 7, in this district and elsewhere in the United States. The Mio Slice ("the accused product") forms a wireless communication system along with another mobile station (e.g., phone tablet, or other mobile device). By making, using, importing, offering for sale, and/or selling such products and services, and all like products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '095 patent pursuant to 35 U.S.C. § 271.

48. Based on present information and belief, the accused product, which is a mobile station, forms a wireless communication system along with another mobile station (e.g., phone, tablet, or other mobile device). The communication protocol employed by the accused product to form the wireless communication system is Bluetooth V4.0 low energy. The wireless communication link is initiated by a companion application installed on the mobile station (e.g. phone or tablet) connected to the accused product.



(https://www.rei.com/product/116401/mio-slice-heart-rate-monitor-and-activity-tracker)



COMPATIBILITY

Compatibility:
- Requires the Mio PAI application for configuration. Free download in the App Store and Google Play Store.

iOS 9.0 and above
- iPhone 7, 7Plus, 6s, 6s Plus, 6, 6 Plus, SE and 5S

Android 5.0 and above
- Google Nexus 5, 5x, 6, 6p
- Samsung Galaxy S5, S6, S7, Note 5

SPECIFICATIONS

Tracks:
- PAI, heart rate, resting heart rate, sleep, calories burned, steps, distance, and time.

Material:
- TPU strap, anodized aluminum main body and buckle

Display:
- OLED

Battery Type:
- Rechargeable li-poly battery with USB charger

Battery Life:
- Up to 5 days (depending on usage and settings)

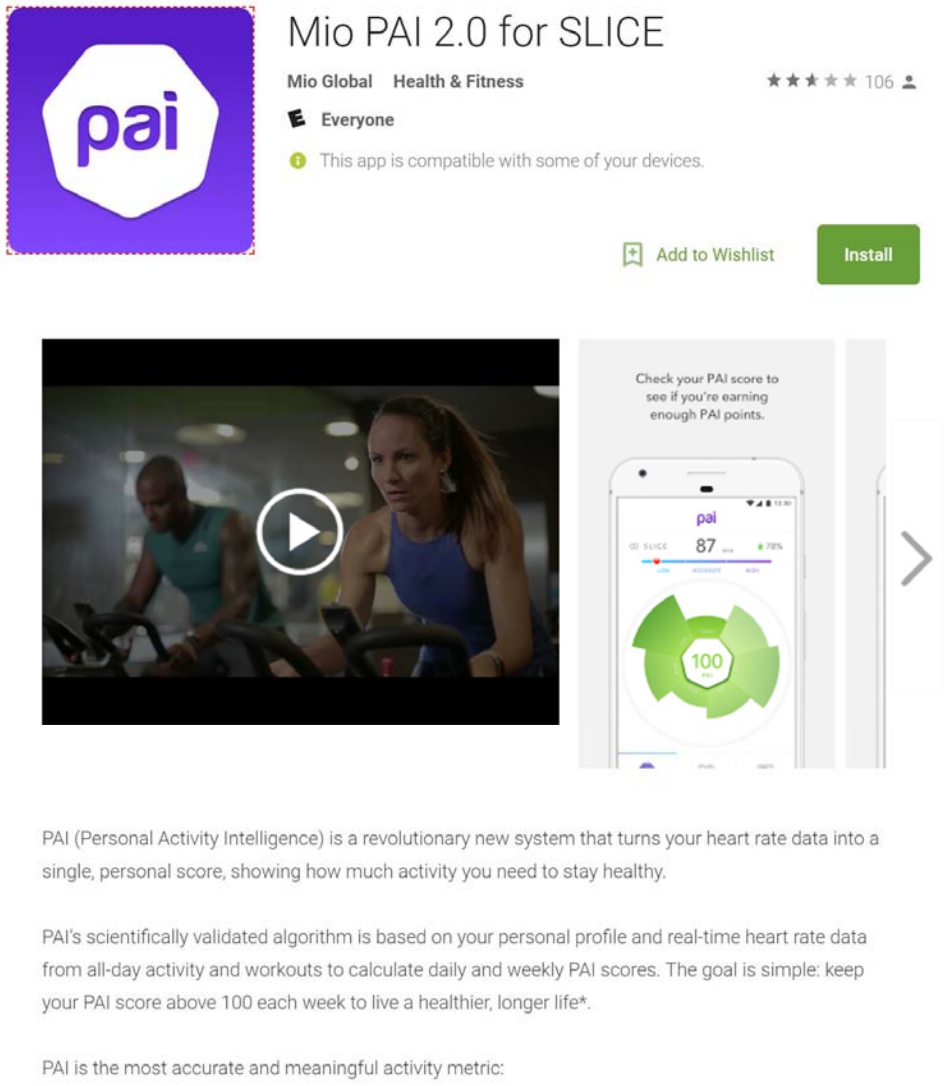
Water Resistant:
- 30m/100 feet (3 ATM)

Sensors & Components:
- Optical heart rate tracker
- 3-axis accelerometer
- Vibration motor

Connectivity:
- Bluetooth Low Energy 4.0+ (select devices)
- ANT+

Memory:
- Saves 7 days of activity data.
- Stores heart rate data at 1 second intervals during exercise, every 5 minutes below moderate activity, and every 15 minutes during sleep.

(https://www.mioglobal.com/en-us/Mio-SLICE-heart-rate-fitness-tracker/Product.aspx)



(https://play.google.com/store/apps/details?id=com.mioglobal.android&hl=en)

Bluetooth	Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.

(Bluetooth V4.0 Spec)

1.1.1 Bluetooth Compliance Requirements

Rev	Date	Comments
4.0	June 30 2010	Updated to support Low Energy, ATT, and GATT support for BR/EDR, and to enable High Speed Controller Subsys-tems.
3.0 + HS	April 21 2009	Updated to include support for the Alternative MAC/PHY feature and High Speed Core Configuration.
v2.1 + EDR	July 26 2007	No content changes. Updates to the Table of Contents.
v2.0 + EDR	Oct 15 2004	This version of the specification is intended to be a sepa-rate Bluetooth Specification that has all the functional char-acteristics of the v1.2 Bluetooth Specification that adds the Enhanced Data Rate (EDR) feature which required changes to Volume 0, Part A, Master Table of Contents.
v1.2	Nov 05 2003	This Part was moved from the Core volume. No content changes been made to this document since v1.1.

(Bluetooth V4.0 Spec)

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, … ,39

Table 2.1: Operating frequency bands

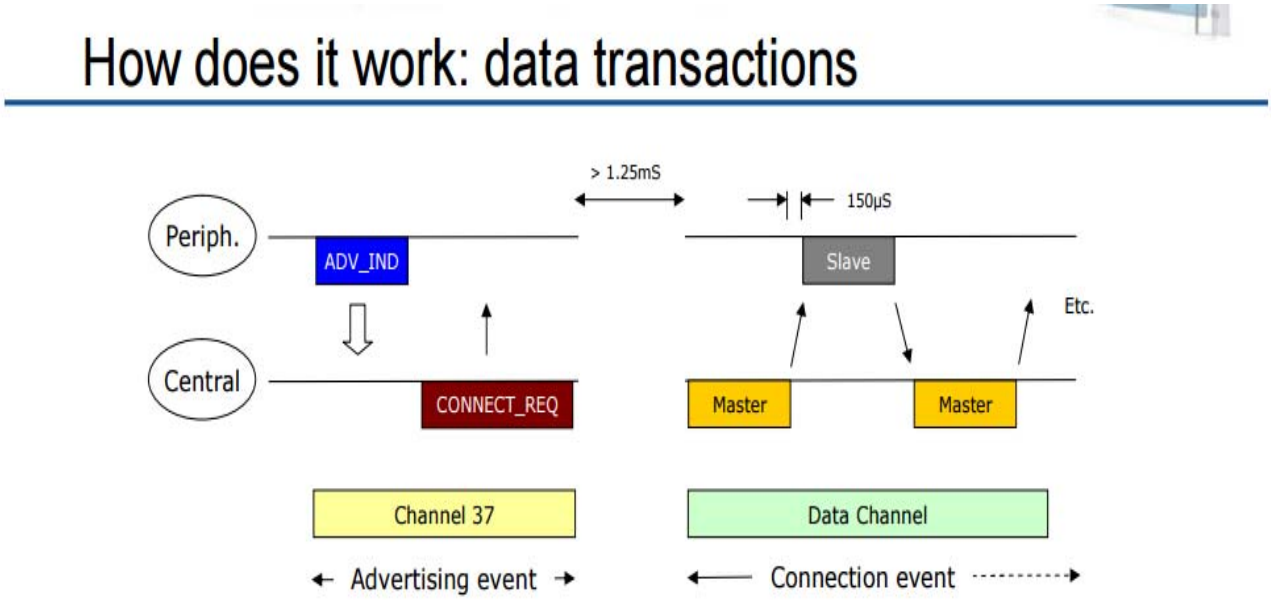
(Bluetooth V4.0 Spec)

1.2 OVERVIEW OF BLUETOOTH LOW ENERGY OPERATION

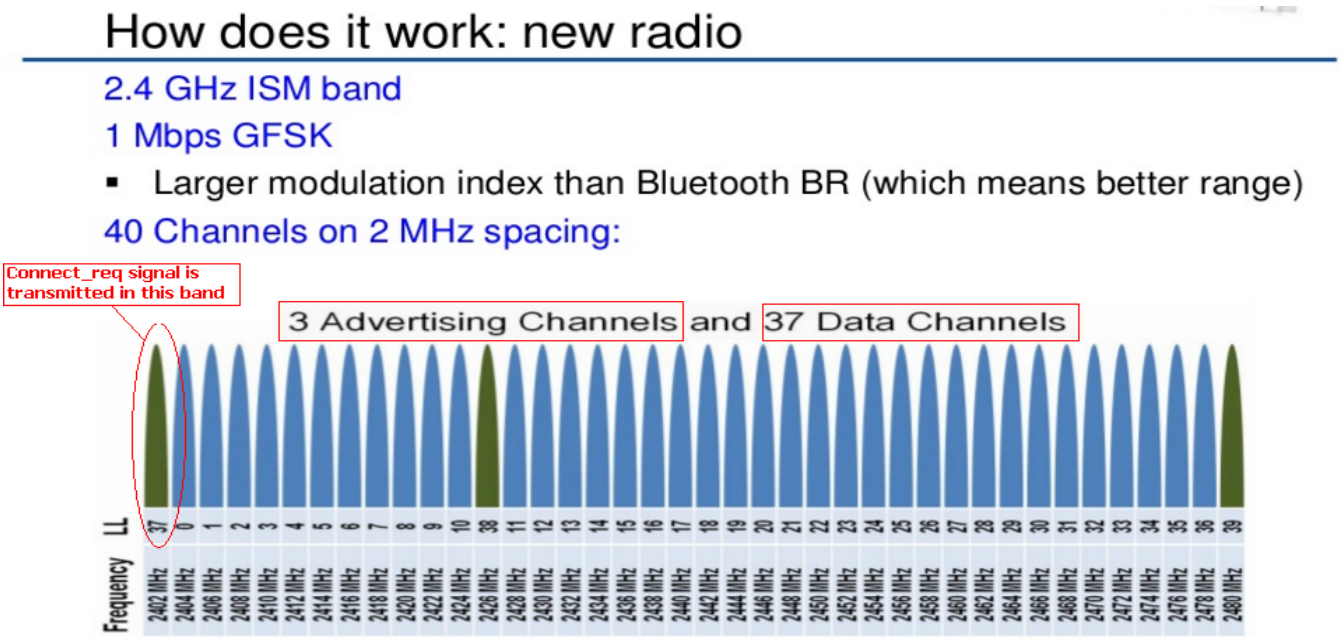
Like the BR/EDR radio, the LE radio operates in the unlicensed 2.4 GHz ISM band. The LE system employs a frequency hopping transceiver to combat interference and fading and provides many FHSS carriers. LE radio operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The symbol rate is 1 Megasymbol per second (Ms/s) supporting the bit rate of 1 Megabit per second (Mb/s).

LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.

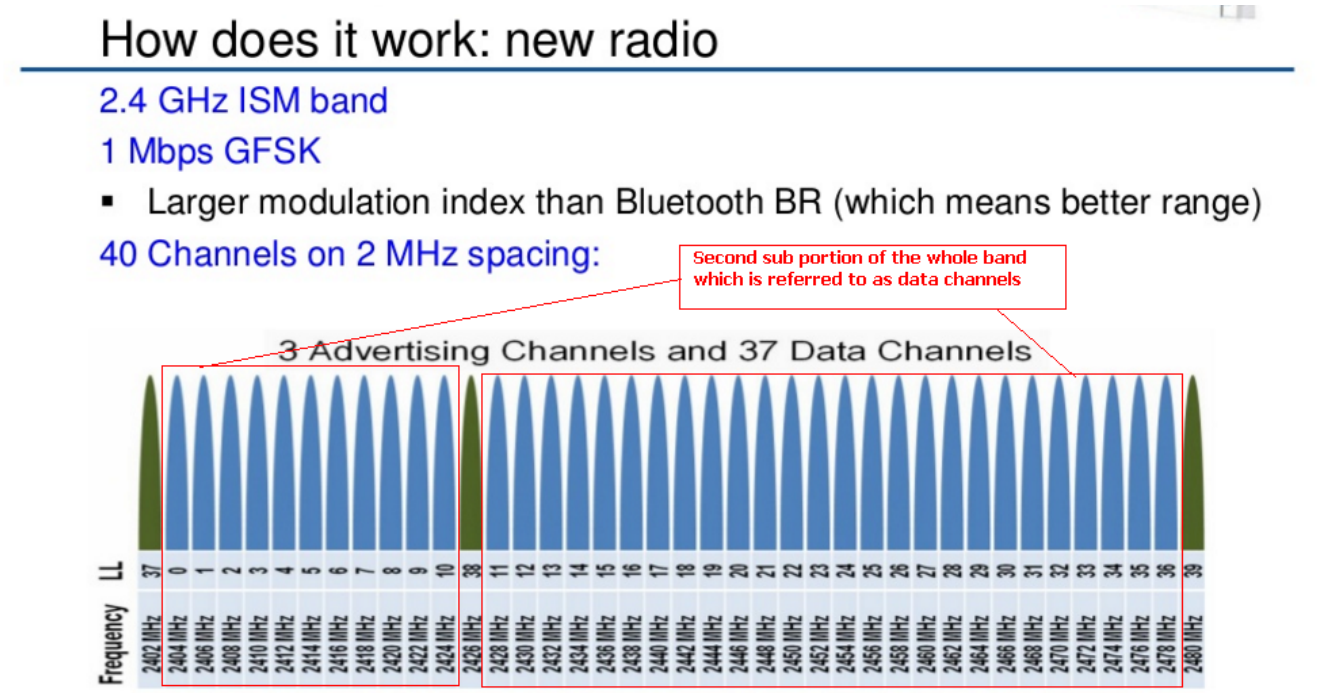
(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)

49. Based on current information and belief, the wireless system comprises a first mobile station (e.g., the accused product) and a second mobile station (e.g., phone, tablet, or

other mobile device). Both are meant to communicate with each other via the Bluetooth v4.0 protocol.

50. Based on current information and belief, the accused product is configured to select a first portion of a radio frequency (RF) band (2.4 GHz-2.4835 GHz of ISM Band) to carry communications (via Bluetooth V4.0 protocol) between the accused product and the second mobile station(e.g., phone, tablet, or other mobile device).

1.4 PHYSICAL CHANNEL

As specified in Part A, Section 2, 40 RF Channels are defined in the 2.4GHz ISM band. These RF Channels are allocated into two LE physical channels: advertising and data. The advertising physical channel uses three RF channels for discovering devices, initiating a connection and broadcasting data. The data physical channel uses up to 37 (see Section 4.5.8) RF channels for communication between connected devices. Each of these RF Channels is allocated a unique channel index (see Section 1.4.1).

(Bluetooth V4.0 Spec)

51. Based on current information and belief, the accused product transmits a first request signal (Connect_Req signal) on a first sub-portion (e.g., double sided spectrum with centre frequency 2.402 GHz, also indexed as channel 37, which is an advertising channel) of the first portion(2.4 GHz-2.4835 GHz) of the RF band directly to the second mobile station(e.g., phone, tablet, portable speaker, headphones or any mobile device) to request communications between the first mobile station(e.g., the accused product) and the second mobile station (e.g., phone, tablet, portable speaker, headphones or any mobile device). The connection request signal is an advertising channel PDU with PDU bit type 0101, the advertising channel PDU is sent over advertising channel (first sub portion). Below is the packet structure of request signal sent by first mobile station (e.g., accused product) to second mobile station.

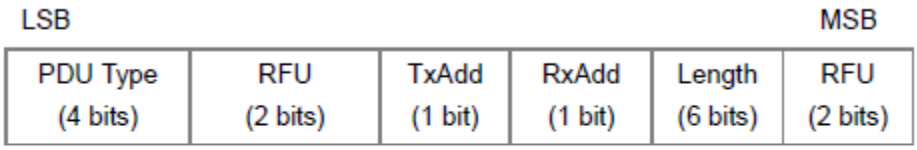
2.3 ADVERTISING CHANNEL PDU

The advertising channel PDU has a 16-bit header and a variable size payload. Its format is as shown in Figure 2.2. The 16 bit Header field of the advertising channel PDU is as shown in Figure 2.3.

LSB MSB

Header (16 bits)	Payload (as per the Length field in the Header)

(Bluetooth V4.0 Spec)



LSB					MSB
PDU Type (4 bits)	RFU (2 bits)	TxAdd (1 bit)	RxAdd (1 bit)	Length (6 bits)	RFU (2 bits)

Figure 2.3: Advertising channel PDU Header

The PDU Type field of the advertising channel PDU that is contained in the header indicates the PDU type as defined in Table 2.1.

(Bluetooth V4.0 Spec)

PDU Type $b_3b_2b_1b_0$	Packet Name
0000	ADV_IND
0001	ADV_DIRECT_IND
0010	ADV_NONCONN_IND
0011	SCAN_REQ
0100	SCAN_RSP
0101	CONNECT_REQ
0110	ADV_SCAN_IND
0111-1111	Reserved

Table 2.1: Advertising channel PDU Header's PDU Type field encoding

(Bluetooth V4.0 Spec)

2.3.3 Initiating PDUs

The following advertising channel PDU Type is called the initiating PDU:

- CONNECT_REQ

This PDU is sent by the Link Layer in the Initiating State and received by the Link Layer in the Advertising State.

2.3.3.1 CONNECT_REQ

The CONNECT_REQ PDU has the Payload as shown in Figure 2.10. TxAdd in the Flags field indicates whether the initiator's device address in the InitA field is public (TxAdd = 0) or random (TxAdd = 1). The RxAdd in the Flags field indicates whether the advertiser's device address in the AdvA field is public (RxAdd = 0) or random (RxAdd = 1).

Payload		
InitA (6 octets)	AdvA (6 octets)	LLData (22 octets)

Figure 2.10: CONNECT_REQ PDU payload

The format of the LLData field is shown in Figure 2.11.

(Bluetooth V4.0 Spec)

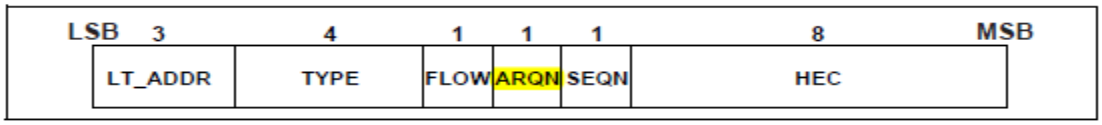
52. Based on current information and belief, the accused product establishes in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band(2.4 GHz-2.4835 GHz of ISM band) and start exchanging data packets of the format shown below.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



(Bluetooth V4.0 Spec)

2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

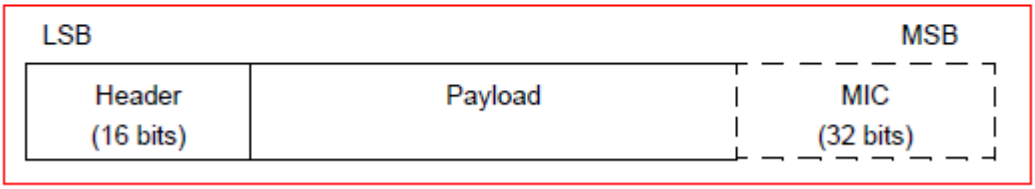
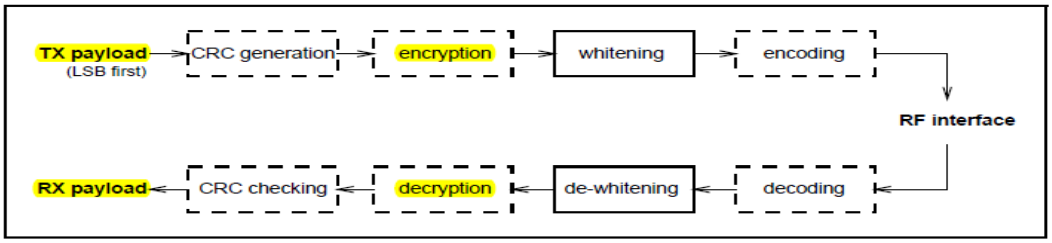


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

53. Based on current information and belief, the accused product encrypts the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey (common key), wherein the message exchanged between the accused product and the second mobile stations are encrypted using the Ckey (common key) In a public private key system a receiver receives an encrypted message and decrypts the same with a private key.



(Bluetooth V4.0 Spec)

Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.
Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.

(Bluetooth V4.0 Spec)

A private key is used to decrypt the encrypted message.

Term	Definition
DHKey	Diffie Hellman key
Ex	Check value from device X
f1( )	Used to generate the 128-bit commitment values Ca and Cb
f2( )	Used to compute the link key and possible other keys from the DHKey and random nonces
f3( )	Used to compute check values Ea and Eb in Authentication Stage 2
g( )	Used to compute numeric check values
h2( )	Used to compute Generic AMP and Dedicated AMP keys
IOcapA	IO capabilities of device A
IOcapB	IO capabilities of device B
LK	Link Key
Nx	Nonce (unique random value) from device X
Nxi	i^{th} nonce (unique random value) from device X. Only used in the passkey entry protocol
PKx	Public Key of device X
rx	Random value generated by device X
rxi	Bit i of the random value rx. Only used in the passkey entry protocol
SKx	Secret (Private) Key of device X
Vx	Confirmation value on device X. Only used in the numeric compare protocol.
X	BD_ADDR of device X

(Bluetooth V4.0 Spec)

When in Simple Pairing debug mode, the Link Manager shall use the following Diffie Hellman private / public key pair:

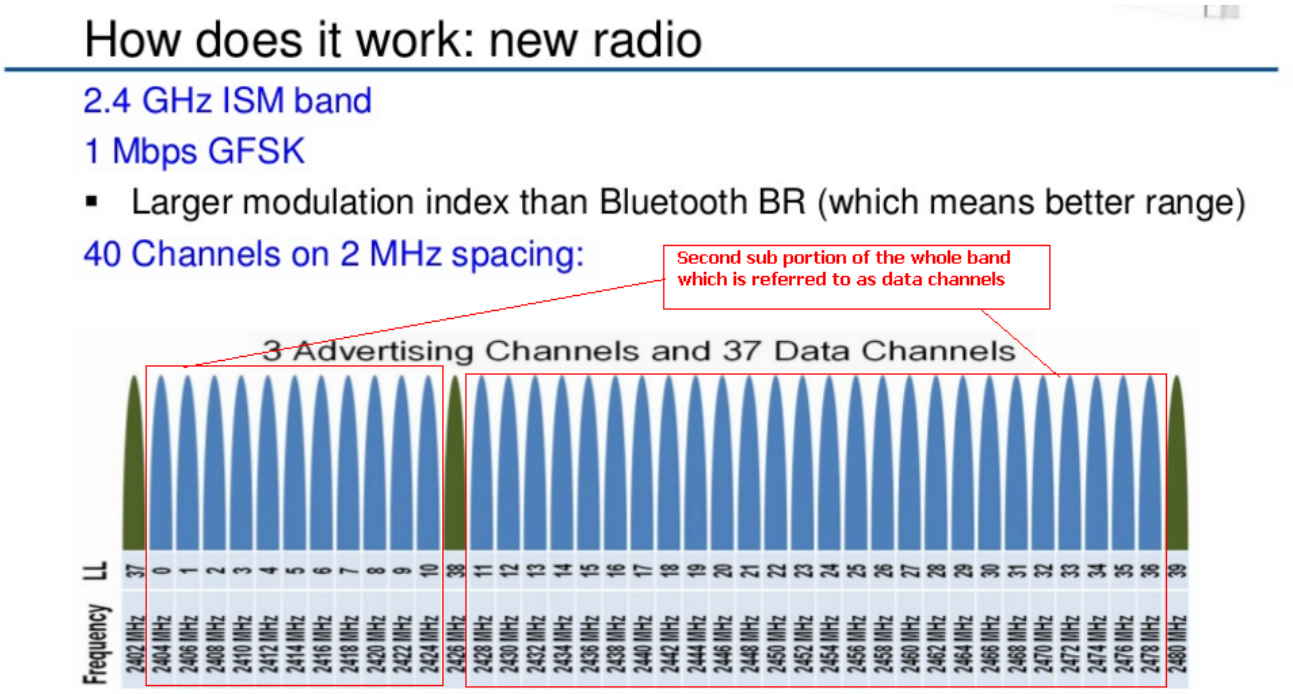
- Private key: 07915f86918ddc27005df1d6cf0c142b625ed2eff4a518ff
- Public key (X): 152070099844 21a6586f9fc3fe7e4329d2809ea51125f8ed
- Public key (Y): b09d42b81bc5bd009f79e4b59dbbaa857fca856fb9f7ea25

(Bluetooth V4.0 Spec)

The lifetime of a temporary link key is limited by the lifetime of the current session – it shall not be reused in a later session. Typically, in a point-to-multipoint configuration where the same information is to be distributed securely to several recipients, a common encryption key is useful. To achieve this, a special link key (denoted master key) may temporarily replace the current link keys. The details of this procedure are found in Section 3.2.6 on page 1069.

(Bluetooth V4.0 Spec)

54. Based on current information and the belief, the second mobile station transmits a first acknowledgement signal after receiving the first request signal Connect_Req signal).Thereafter, the accused product directly receives a first acknowledge signal on a second sub-portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) of the first portion of the RF band (2.4 GHz-2.4835 GHz of ISM band) to acknowledge the first request signal (Connect_Req signal). The second sub portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) is used to receive the acknowledgement signal.



The connectable directed advertising event type allows an initiator to respond with a connect request. An initiator may send a connect request (CONNECT_REQ PDU) to request the Link Layer to enter the Connection State.

(Bluetooth V4.0 Spec)

As is mentioned below, Bluetooth uses an acknowledgment scheme in which for every packet received, an acknowledgement signal is sent to the source.

Bluetooth uses a fast, unnumbered acknowledgment scheme. An ACK (ARQN=1) or a NAK (ARQN=0) is returned in response to the receipt of previously received packet. The slave shall respond in the slave-to-master slot directly following the master-to-slave slot unless the slave has scatternet commitments in that timeslot; the master shall respond at the next event addressing the same slave (the master may have addressed other slaves between the last received packet from the considered slave and the master response to this packet). For a packet reception to be successful, at least the HEC must pass. In addition, the CRC must pass if present.

The BR/EDR Baseband, LE Link Layer, and AMP MAC layers provides the basic acknowledgement/repeat request (ARQ) protocol in Bluetooth. The L2CAP layer can optionally provide a further error detection and retransmission to the L2CAP PDUs. This feature is recommended for applications with requirements for a low probability of undetected errors in the user data. A further optional feature of L2CAP is a window-based flow control that can be used to manage buffer allocation in the receiving device. Both of these optional features augment the QoS performance in certain scenarios. Not all of the L2CAP capabilities are available when using the LE system.

6.4.4 ARQN

The 1-bit acknowledgment indication ARQN is used to inform the source of a successful transfer of payload data with CRC, and can be positive acknowledge ACK or negative acknowledge NAK. See Section 7.6 on page 141 for initialization and usage of this bit.

2.1.2.4 Link Controller

The link controller is responsible for the encoding and decoding of Bluetooth packets from the data payload and parameters related to the physical channel, logical transport and logical link.

The link controller carries out the link control protocol signaling in BR/EDR and link layer protocol in LE (in close conjunction with the scheduling function of the resource manager), which is used to communicate flow control and acknowledgement and retransmission request signals. The interpretation of these signals is a characteristic of the logical transport associated with the baseband packet. Interpretation and control of the link control signaling is normally associated with the resource manager's scheduler.

(Bluetooth V4.0 Spec)

Once the second mobile station receives connect_req signal it enters into the connection state where it transmits data on data channels (second sub portion of band formed of frequencies ranging from : 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz).

4.5 CONNECTION STATE

The Link Layer enters the Connection State when an initiator sends a CONNECT_REQ PDU to an advertiser or an advertiser receives a CONNECT_REQ PDU from an initiator.

(Bluetooth V4.0 Spec)

Therefore the second mobile station sends an acknowledgement signal to the first mobile station after receiving connect_req. Since after receipt the connect_req by second mobile station the stations enters connection state mode, where all the signals are sent over data channel and the acknowledgement is sent over the data channels.

4.5.1 Connection Events

The Link Layer in the Connection State shall only transmit Data Channel PDUs (see Section 2.4) in connection events. The master and slave shall determine the data channel index for each connection event as defined in Section 4.5.8. The same data channel index shall be used for all packets in the connection event. Each connection event contains at least one packet sent by the master.

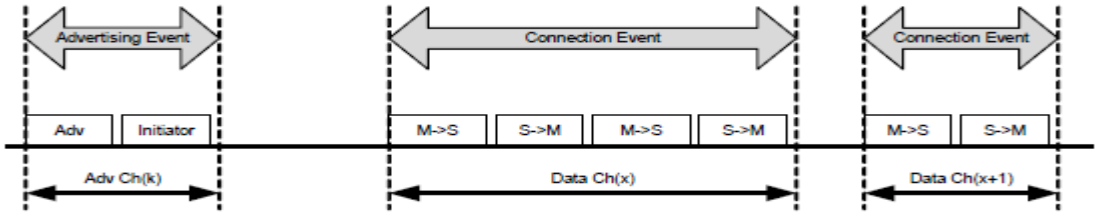
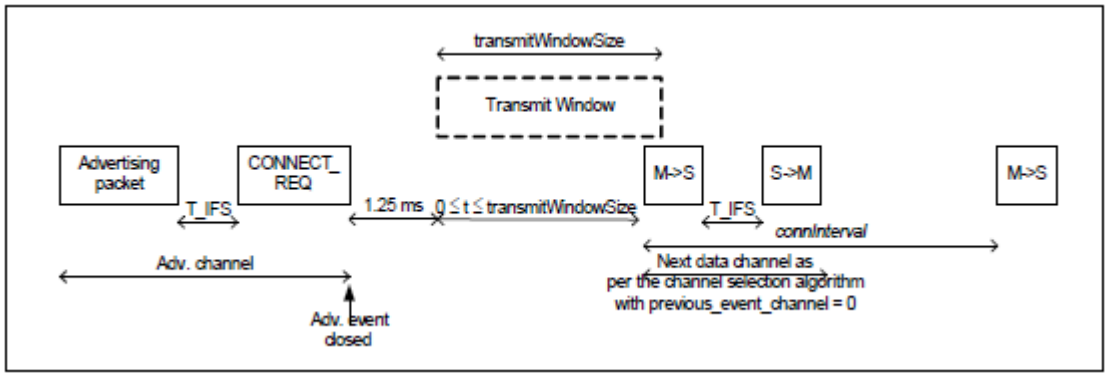


Figure 1.4: Connection Events



(Bluetooth V4.0 Spec)

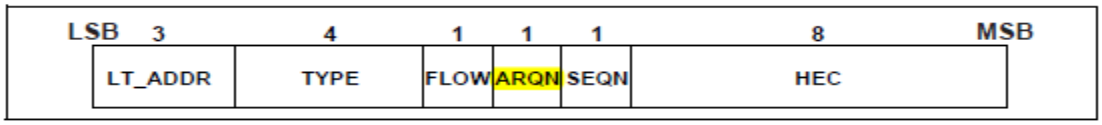
Below is the packet structure of a packet sent over data channels.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

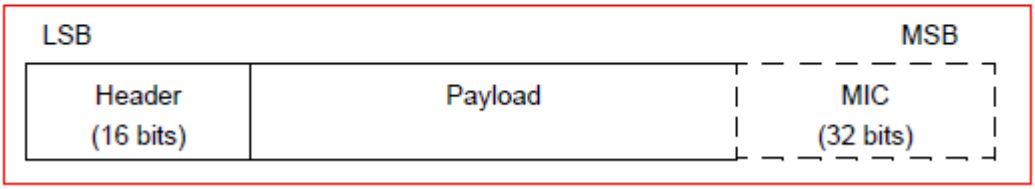


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

55. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

56. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

57. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

58. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT IV

INFRINGEMENT OF U.S. PATENT NO. 6,321,095 (Suunto Spartan Sport GPS Multifunction Watch)

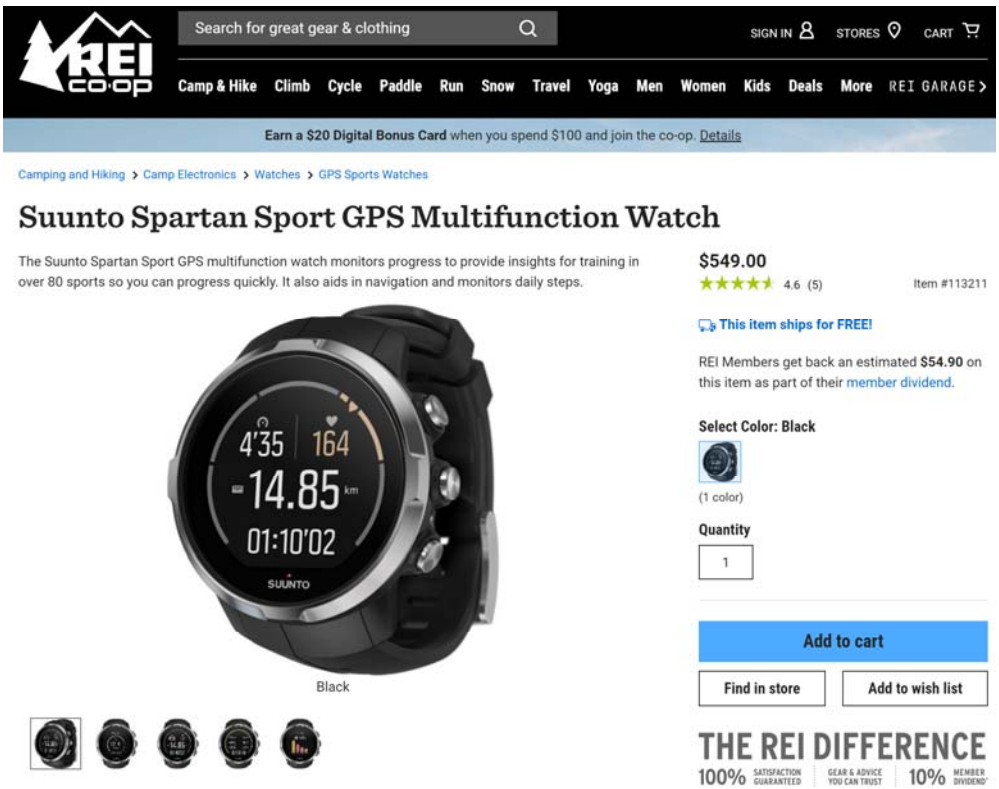
59. Plaintiff is the owner of United States Patent No. 6,321,095 ("the '095 patent") entitled "Wireless Communications Approach." The '095 Patent issued on November 20, 2001. A true and correct copy of the '095 Patent is attached as Exhibit A.

60. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '095 patent. The '095 patent provides, among other things, " A wireless communication system comprising: a first mobile station; and a second mobile station; wherein the first mobile station is configured to select a first portion of a radio frequency (RF) band to carry communications between the first mobile station and the second mobile station, transmit a first request signal on a first sub-portion of the first portion of the RF band directly to the second mobile station to request communications between the first mobile station and the second mobile station, establish in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band; encrypt the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey, wherein the message exchanged between the first and the second mobile stations are encrypted using the Ckey; and Wherein the second mobile station is configured to transmit, in response to receiving the first request signal from the first mobile station, the first acknowledge signal on a second sub-portion of the first portion of the RF band directly to the first mobile station to acknowledge the first request signal."

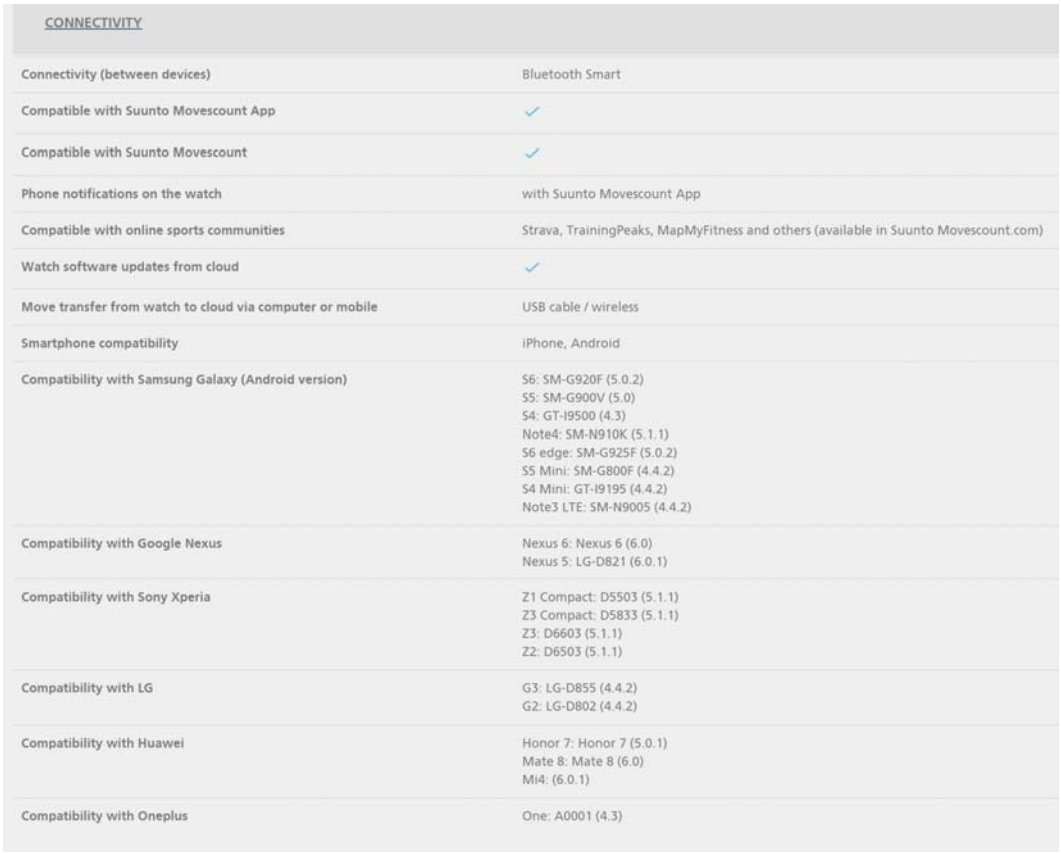
61. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services

that infringed one or more claims of the '095 patent, including at least Claim 7, in this district and elsewhere in the United States. The Suunto Spartan Sport GPS Multifunction watch ("the accused product") forms a wireless communication system along with another mobile station (e.g., phone tablet, or other mobile device). By making, using, importing, offering for sale, and/or selling such products and services, and all like products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '095 patent pursuant to 35 U.S.C. § 271.

62. Based on present information and belief, the accused product, which is a mobile station, forms a wireless communication system along with another mobile station (e.g., phone, tablet, or other mobile device). The communication protocol employed by the accused product to form the wireless communication system is Bluetooth V4.0 low energy aka Bluetooth smart. The wireless communication link is initiated by a companion application installed on the mobile station (e.g. phone or tablet) connected to the accused product.

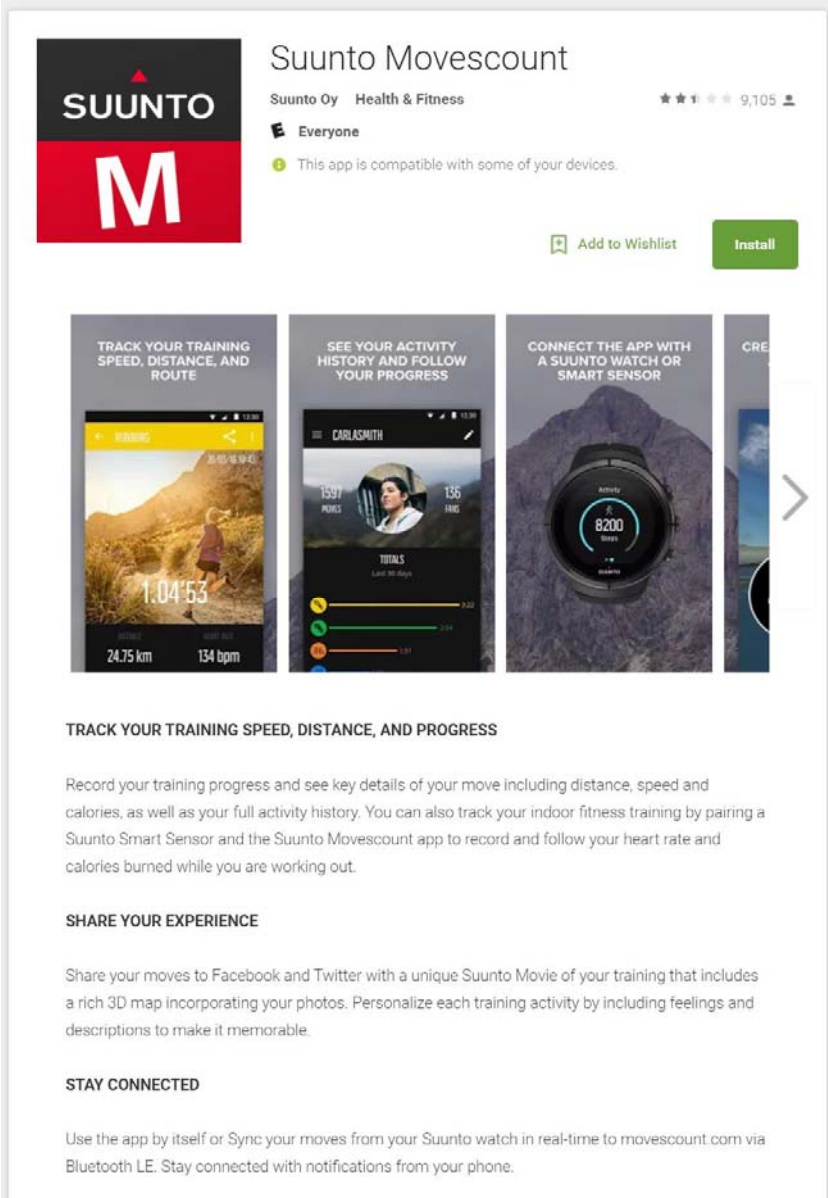


(https://www.rei.com/product/113211/suunto-spartan-sport-gps-multifunction-watch)



CONNECTIVITY	
Connectivity (between devices)	Bluetooth Smart
Compatible with Suunto Movescount App	✓
Compatible with Suunto Movescount	✓
Phone notifications on the watch	with Suunto Movescount App
Compatible with online sports communities	Strava, TrainingPeaks, MapMyFitness and others (available in Suunto Movescount.com)
Watch software updates from cloud	✓
Move transfer from watch to cloud via computer or mobile	USB cable / wireless
Smartphone compatibility	iPhone, Android
Compatibility with Samsung Galaxy (Android version)	S6: SM-G920F (5.0.2) S5: SM-G900V (5.0) S4: GT-I9500 (4.3) Note4: SM-N910K (5.1.1) S6 edge: SM-G925F (5.0.2) S5 Mini: SM-G800F (4.4.2) S4 Mini: GT-I9195 (4.4.2) Note3 LTE: SM-N9005 (4.4.2)
Compatibility with Google Nexus	Nexus 6: Nexus 6 (6.0) Nexus 5: LG-D821 (6.0.1)
Compatibility with Sony Xperia	Z1 Compact: D5503 (5.1.1) Z3 Compact: D5833 (5.1.1) Z3: D6603 (5.1.1) Z2: D6503 (5.1.1)
Compatibility with LG	G3: LG-D855 (4.4.2) G2: LG-D802 (4.4.2)
Compatibility with Huawei	Honor 7: Honor 7 (5.0.1) Mate 8: Mate 8 (6.0) MI4: (6.0.1)
Compatibility with Oneplus	One: A0001 (4.3)

(http://www.suunto.com/en-US/Products/Sports-Watches/suunto-spartan-sport-wrist-hr/Suunto-Spartan-Sport-Wrist-HR-All-Black/)



(https://play.google.com/store/apps/details?id=com.suunto.movescount.android&hl=en)

Bluetooth	Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.

(Bluetooth V4.0 Spec)

1.1.1 Bluetooth Compliance Requirements

Rev	Date	Comments
4.0	June 30 2010	Updated to support Low Energy, ATT, and GATT support for BR/EDR, and to enable High Speed Controller Subsys-tems.
3.0 + HS	April 21 2009	Updated to include support for the Alternative MAC/PHY feature and High Speed Core Configuration.
v2.1 + EDR	July 26 2007	No content changes. Updates to the Table of Contents.
v2.0 + EDR	Oct 15 2004	This version of the specification is intended to be a sepa-rate Bluetooth Specification that has all the functional char-acteristics of the v1.2 Bluetooth Specification that adds the Enhanced Data Rate (EDR) feature which required changes to Volume 0, Part A, Master Table of Contents.
v1.2	Nov 05 2003	This Part was moved from the Core volume. No content changes been made to this document since v1.1.

(Bluetooth V4.0 Spec)

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, … ,39

Table 2.1: Operating frequency bands

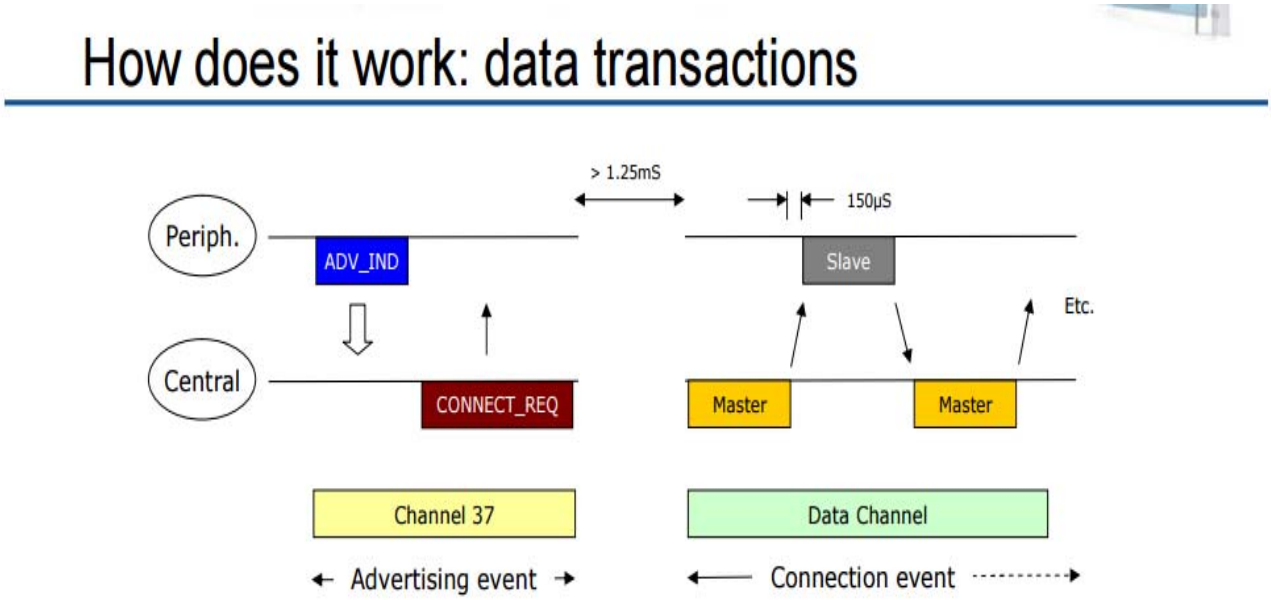
(Bluetooth V4.0 Spec)

1.2 OVERVIEW OF BLUETOOTH LOW ENERGY OPERATION

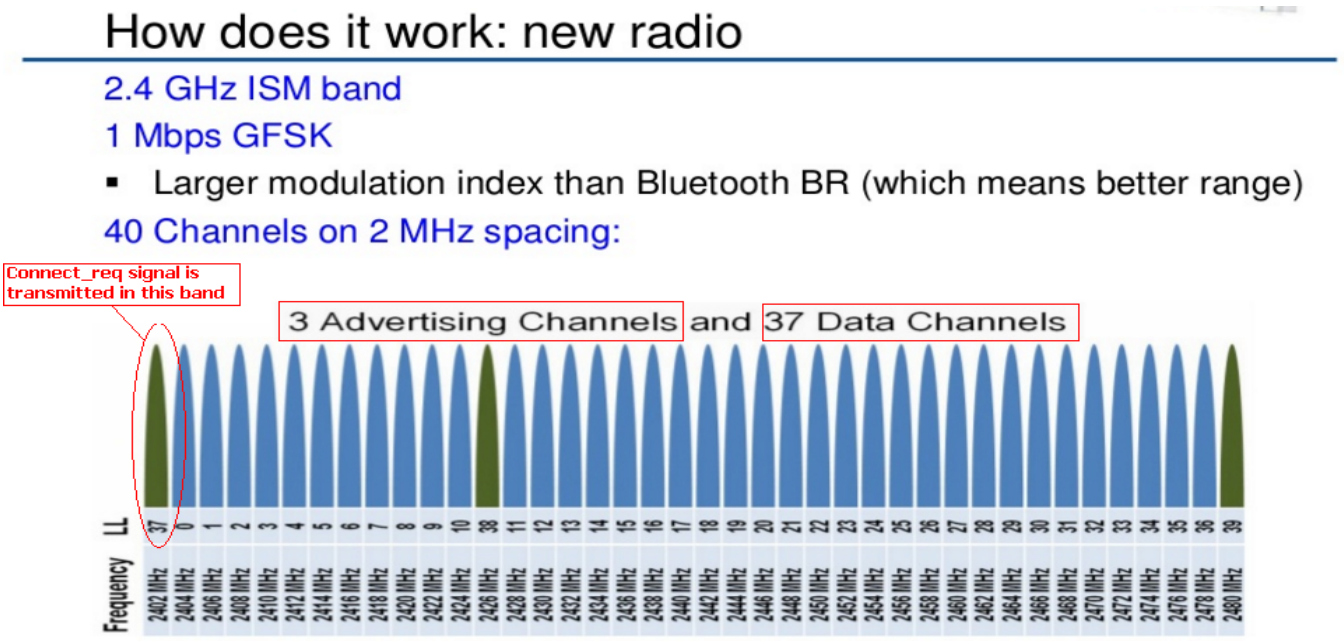
Like the BR/EDR radio, the LE radio operates in the unlicensed 2.4 GHz ISM band. The LE system employs a frequency hopping transceiver to combat interference and fading and provides many FHSS carriers. LE radio operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The symbol rate is 1 Megasymbol per second (Ms/s) supporting the bit rate of 1 Megabit per second (Mb/s).

LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.

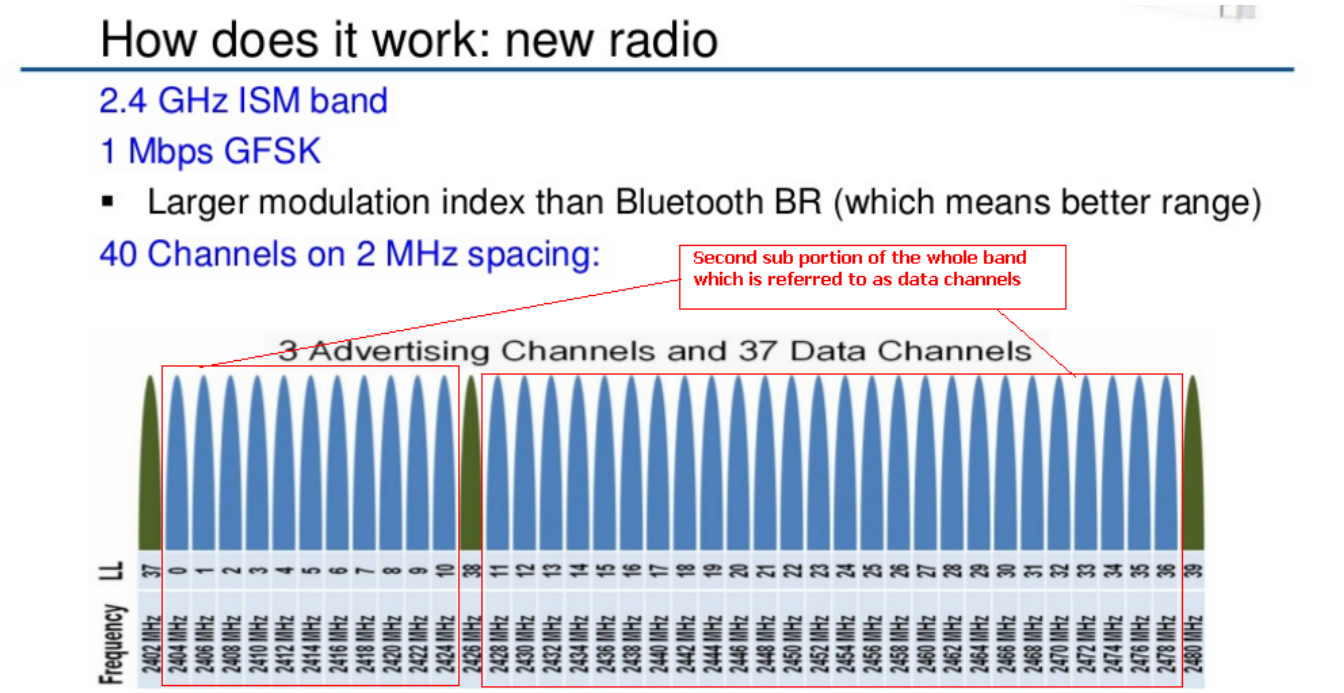
(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)

63. Based on current information and belief, the wireless system comprises a first mobile station (e.g., the accused product) and a second mobile station (e.g., phone, tablet, or

other mobile device). Both are meant to communicate with each other via the Bluetooth v4.0 protocol.

64. Based on current information and belief, the accused product is configured to select a first portion of a radio frequency (RF) band (2.4 GHz-2.4835 GHz of ISM Band) to carry communications (via Bluetooth V4.0 protocol) between the accused product and the second mobile station(e.g., phone, tablet, or other mobile device).

1.4 PHYSICAL CHANNEL

As specified in Part A, Section 2, 40 RF Channels are defined in the 2.4GHz ISM band. These RF Channels are allocated into two LE physical channels: advertising and data. The advertising physical channel uses three RF channels for discovering devices, initiating a connection and broadcasting data. The data physical channel uses up to 37 (see Section 4.5.8) RF channels for communication between connected devices. Each of these RF Channels is allocated a unique channel index (see Section 1.4.1).

(Bluetooth V4.0 Spec)

65. Based on current information and belief, the accused product transmits a first request signal (Connect_Req signal) on a first sub-portion (e.g., double sided spectrum with centre frequency 2.402 GHz, also indexed as channel 37, which is an advertising channel) of the first portion(2.4 GHz-2.4835 GHz) of the RF band directly to the second mobile station(e.g., phone, tablet, portable speaker, headphones or any mobile device) to request communications between the first mobile station(e.g., the accused product) and the second mobile station (e.g., phone, tablet, portable speaker, headphones or any mobile device). The connection request signal is an advertising channel PDU with PDU bit type 0101, the advertising channel PDU is sent over advertising channel (first sub portion). Below is the packet structure of request signal sent by first mobile station (e.g., accused product) to second mobile station.

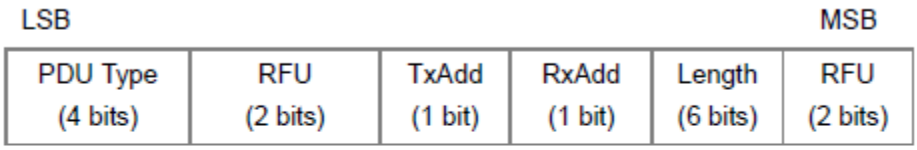
2.3 ADVERTISING CHANNEL PDU

The advertising channel PDU has a 16-bit header and a variable size payload. Its format is as shown in Figure 2.2. The 16 bit Header field of the advertising channel PDU is as shown in Figure 2.3.

LSB MSB

Header (16 bits)	Payload (as per the Length field in the Header)

(Bluetooth V4.0 Spec)



LSB					MSB
PDU Type (4 bits)	RFU (2 bits)	TxAdd (1 bit)	RxAdd (1 bit)	Length (6 bits)	RFU (2 bits)

Figure 2.3: Advertising channel PDU Header

The PDU Type field of the advertising channel PDU that is contained in the header indicates the PDU type as defined in Table 2.1.

(Bluetooth V4.0 Spec)

PDU Type $b_3b_2b_1b_0$	Packet Name
0000	ADV_IND
0001	ADV_DIRECT_IND
0010	ADV_NONCONN_IND
0011	SCAN_REQ
0100	SCAN_RSP
0101	CONNECT_REQ
0110	ADV_SCAN_IND
0111-1111	Reserved

Table 2.1: Advertising channel PDU Header's PDU Type field encoding

(Bluetooth V4.0 Spec)

2.3.3 Initiating PDUs

The following advertising channel PDU Type is called the initiating PDU:

- CONNECT_REQ

This PDU is sent by the Link Layer in the Initiating State and received by the Link Layer in the Advertising State.

2.3.3.1 CONNECT_REQ

The CONNECT_REQ PDU has the Payload as shown in Figure 2.10. TxAdd in the Flags field indicates whether the initiator's device address in the InitA field is public (TxAdd = 0) or random (TxAdd = 1). The RxAdd in the Flags field indicates whether the advertiser's device address in the AdvA field is public (RxAdd = 0) or random (RxAdd = 1).

Payload		
InitA (6 octets)	AdvA (6 octets)	LLData (22 octets)

Figure 2.10: CONNECT_REQ PDU payload

The format of the LLData field is shown in Figure 2.11.

(Bluetooth V4.0 Spec)

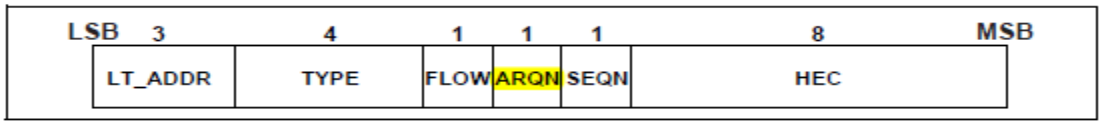
66. Based on current information and belief, the accused product establishes in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band(2.4 GHz-2.4835 GHz of ISM band) and start exchanging data packets of the format shown below.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



(Bluetooth V4.0 Spec)

2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

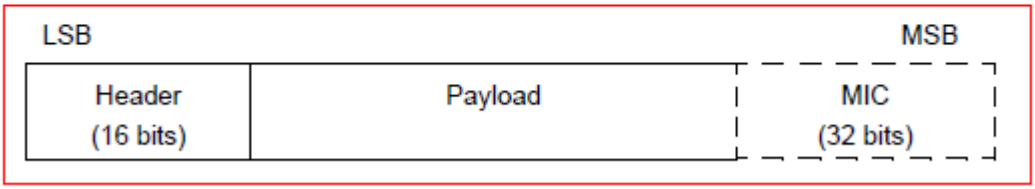
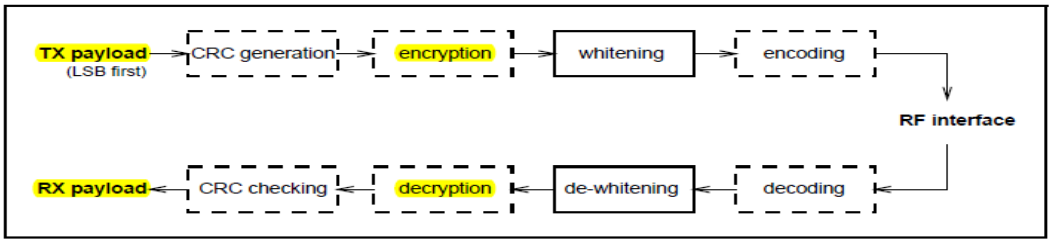


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

67. Based on current information and belief, the accused product encrypts the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey (common key), wherein the message exchanged between the accused product and the second mobile stations are encrypted using the Ckey (common key) In a public private key system a receiver receives an encrypted message and decrypts the same with a private key.



(Bluetooth V4.0 Spec)

Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.
Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.

(Bluetooth V4.0 Spec)

A private key is used to decrypt the encrypted message.

Term	Definition
DHKey	Diffie Hellman key
Ex	Check value from device X
f1( )	Used to generate the 128-bit commitment values Ca and Cb
f2( )	Used to compute the link key and possible other keys from the DHKey and random nonces
f3( )	Used to compute check values Ea and Eb in Authentication Stage 2
g( )	Used to compute numeric check values
h2( )	Used to compute Generic AMP and Dedicated AMP keys
IOcapA	IO capabilities of device A
IOcapB	IO capabilities of device B
LK	Link Key
Nx	Nonce (unique random value) from device X
Nxi	i^{th} nonce (unique random value) from device X. Only used in the passkey entry protocol
PKx	Public Key of device X
rx	Random value generated by device X
rxi	Bit i of the random value rx. Only used in the passkey entry protocol
SKx	Secret (Private) Key of device X
Vx	Confirmation value on device X. Only used in the numeric compare protocol.
X	BD_ADDR of device X

(Bluetooth V4.0 Spec)

When in Simple Pairing debug mode, the Link Manager shall use the following Diffie Hellman private / public key pair:

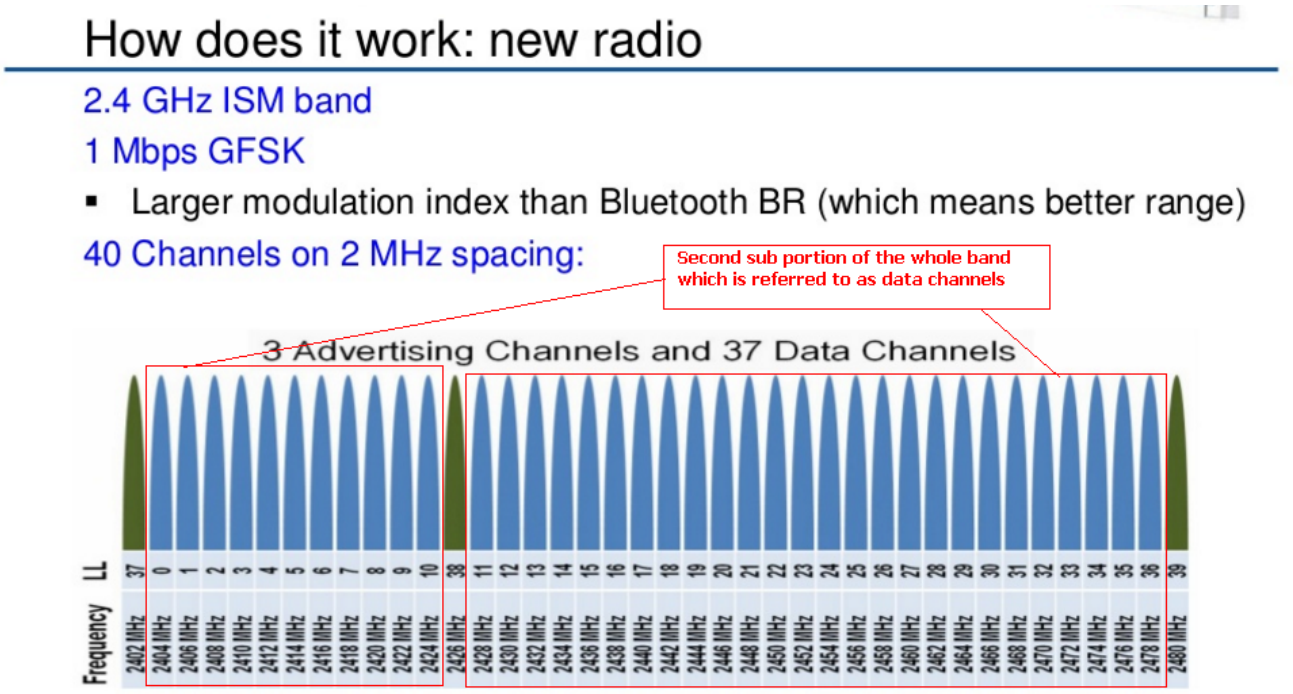
- Private key: 07915f86918ddc27005df1d6cf0c142b625ed2eff4a518ff
- Public key (X): 152070099844 21a6586f9fc3fe7e4329d2809ea51125f8ed
- Public key (Y): b09d42b81bc5bd009f79e4b59dbbaa857fca856fb9f7ea25

(Bluetooth V4.0 Spec)

The lifetime of a temporary link key is limited by the lifetime of the current session – it shall not be reused in a later session. Typically, in a point-to-multipoint configuration where the same information is to be distributed securely to several recipients, a common encryption key is useful. To achieve this, a special link key (denoted master key) may temporarily replace the current link keys. The details of this procedure are found in Section 3.2.6 on page 1069.

(Bluetooth V4.0 Spec)

68. Based on current information and the belief, the second mobile station transmits a first acknowledgement signal after receiving the first request signal Connect_Req signal).Thereafter, the accused product directly receives a first acknowledge signal on a second sub-portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) of the first portion of the RF band (2.4 GHz-2.4835 GHz of ISM band) to acknowledge the first request signal (Connect_Req signal). The second sub portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) is used to receive the acknowledgement signal.



The connectable directed advertising event type allows an initiator to respond with a connect request. An initiator may send a connect request (CONNECT_REQ PDU) to request the Link Layer to enter the Connection State.

(Bluetooth V4.0 Spec)

As is mentioned below, Bluetooth uses an acknowledgment scheme in which for every packet received, an acknowledgement signal is sent to the source.

Bluetooth uses a fast, unnumbered acknowledgment scheme. An ACK (ARQN=1) or a NAK (ARQN=0) is returned in response to the receipt of previously received packet. The slave shall respond in the slave-to-master slot directly following the master-to-slave slot unless the slave has scatternet commitments in that timeslot; the master shall respond at the next event addressing the same slave (the master may have addressed other slaves between the last received packet from the considered slave and the master response to this packet). For a packet reception to be successful, at least the HEC must pass. In addition, the CRC must pass if present.

The BR/EDR Baseband, LE Link Layer, and AMP MAC layers provides the basic acknowledgement/repeat request (ARQ) protocol in Bluetooth. The L2CAP layer can optionally provide a further error detection and retransmission to the L2CAP PDUs. This feature is recommended for applications with requirements for a low probability of undetected errors in the user data. A further optional feature of L2CAP is a window-based flow control that can be used to manage buffer allocation in the receiving device. Both of these optional features augment the QoS performance in certain scenarios. Not all of the L2CAP capabilities are available when using the LE system.

6.4.4 ARQN

The 1-bit acknowledgment indication ARQN is used to inform the source of a successful transfer of payload data with CRC, and can be positive acknowledge ACK or negative acknowledge NAK. See Section 7.6 on page 141 for initialization and usage of this bit.

2.1.2.4 Link Controller

The link controller is responsible for the encoding and decoding of Bluetooth packets from the data payload and parameters related to the physical channel, logical transport and logical link.

The link controller carries out the link control protocol signaling in BR/EDR and link layer protocol in LE (in close conjunction with the scheduling function of the resource manager), which is used to communicate flow control and acknowledgement and retransmission request signals. The interpretation of these signals is a characteristic of the logical transport associated with the baseband packet. Interpretation and control of the link control signaling is normally associated with the resource manager's scheduler.

(Bluetooth V4.0 Spec)

Once the second mobile station receives connect_req signal it enters into the connection state where it transmits data on data channels (second sub portion of band formed of frequencies ranging from : 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz).

4.5 CONNECTION STATE

The Link Layer enters the Connection State when an initiator sends a CONNECT_REQ PDU to an advertiser or an advertiser receives a CONNECT_REQ PDU from an initiator.

(Bluetooth V4.0 Spec)

Therefore the second mobile station sends an acknowledgement signal to the first mobile station after receiving connect_req. Since after receipt the connect_req by second mobile station the stations enters connection state mode, where all the signals are sent over data channel and the acknowledgement is sent over the data channels.

4.5.1 Connection Events

The Link Layer in the Connection State shall only transmit Data Channel PDUs (see Section 2.4) in connection events. The master and slave shall determine the data channel index for each connection event as defined in Section 4.5.8. The same data channel index shall be used for all packets in the connection event. Each connection event contains at least one packet sent by the master.

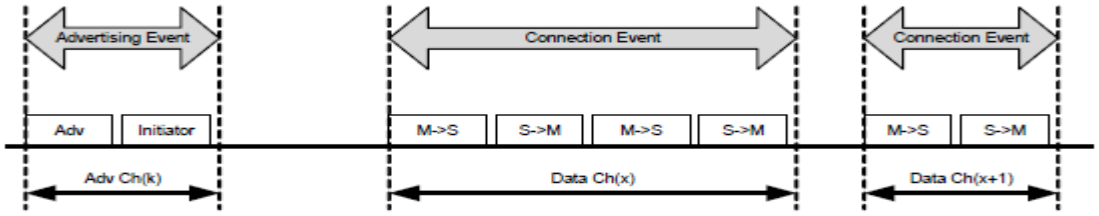
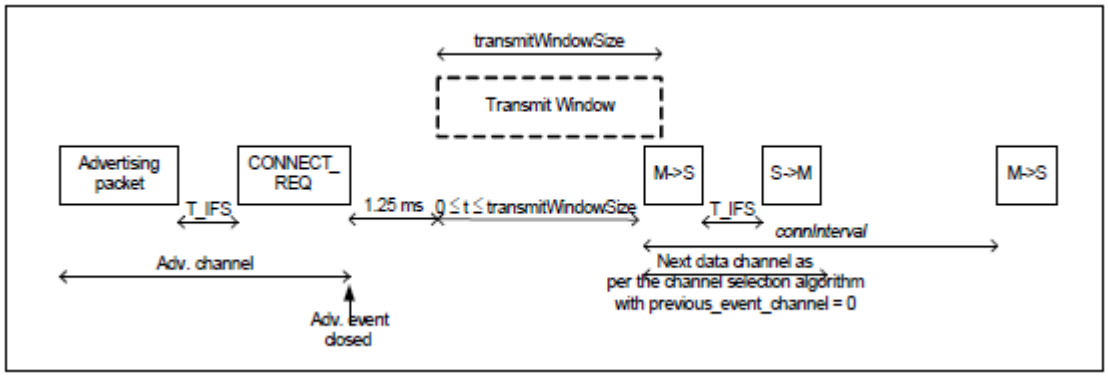


Figure 1.4: Connection Events



(Bluetooth V4.0 Spec)

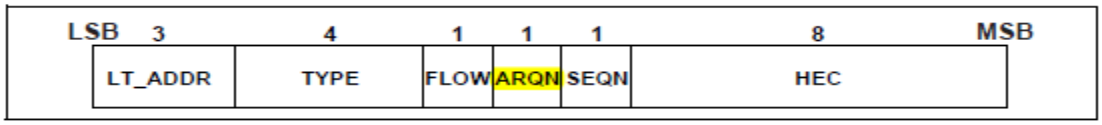
Below is the packet structure of a packet sent over data channels.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

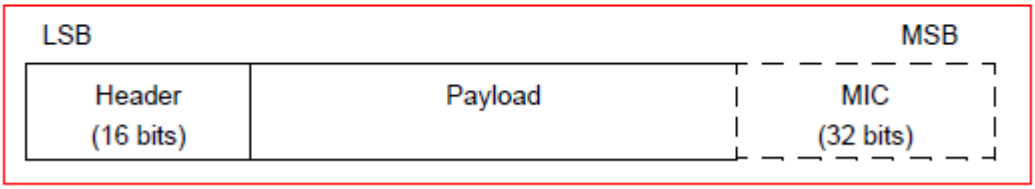


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

69. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

70. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

71. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

72. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 6,321,095 (Polar A360)

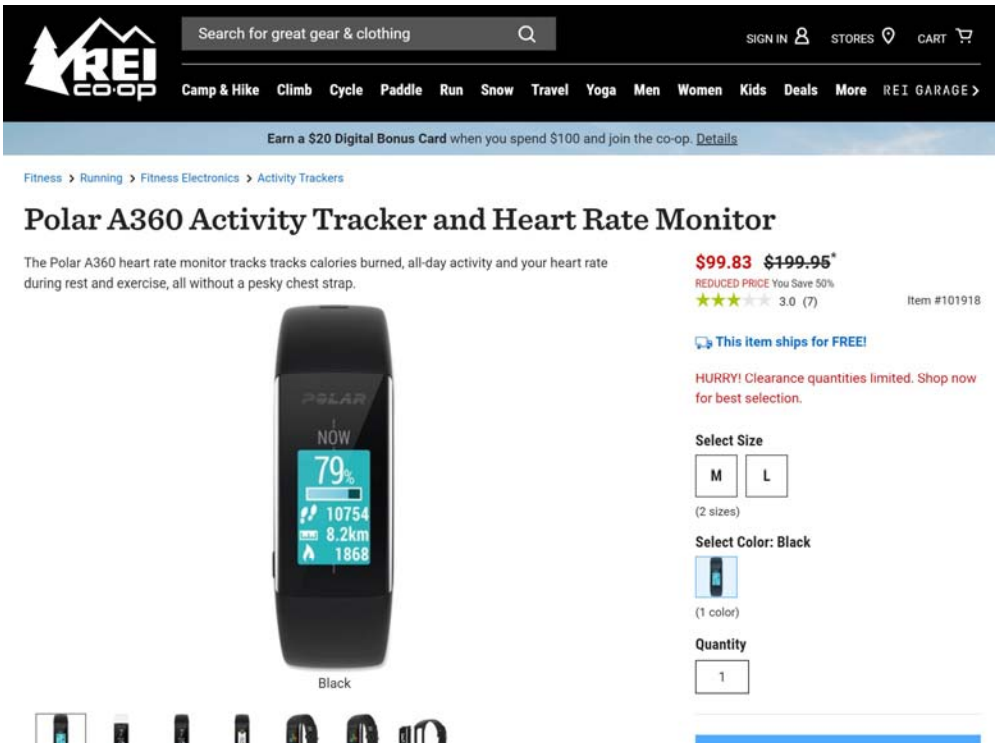
73. Plaintiff is the owner of United States Patent No. 6,321,095 ("the '095 patent") entitled "Wireless Communications Approach." The '095 Patent issued on November 20, 2001. A true and correct copy of the '095 Patent is attached as Exhibit A.

74. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides products and/or services that infringe the '095 patent. The '095 patent provides, among other things, " A wireless communication system comprising: a first mobile station; and a second mobile station; wherein the first mobile station is configured to select a first portion of a radio frequency (RF) band to carry communications between the first mobile station and the second mobile station, transmit a first request signal on a first sub-portion of the first portion of the RF band directly to the second mobile station to request communications between the first mobile station and the second mobile station, establish in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band; encrypt the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey, wherein the message exchanged between the first and the second mobile stations are encrypted using the Ckey; and Wherein the second mobile station is configured to transmit, in response to receiving the first request signal from the first mobile station, the first acknowledge signal on a second sub-portion of the first portion of the RF band directly to the first mobile station to acknowledge the first request signal."

75. Defendant directly and/or through intermediaries, made, has made, used, imported, provided, supplied, distributed, sold, and/or offered for sale products and/or services that infringed one or more claims of the '095 patent, including at least Claim 7, in this district

and elsewhere in the United States. The Polar A360 ("the accused product") forms a wireless communication system along with another mobile station (e.g., phone tablet, or other mobile device). By making, using, importing, offering for sale, and/or selling such products and services, and all like products and services, Defendant has injured Plaintiff and is thus liable for infringement of the '095 patent pursuant to 35 U.S.C. § 271.

76. Based on present information and belief, the accused product, which is a mobile station, forms a wireless communication system along with another mobile station (e.g., phone, tablet, or other mobile device). The communication protocol employed by the accused product to form the wireless communication system is Bluetooth V4.0 low energy aka Bluetooth smart. The wireless communication link is initiated by a companion application installed on the mobile station (e.g. phone or tablet) connected to the accused product.

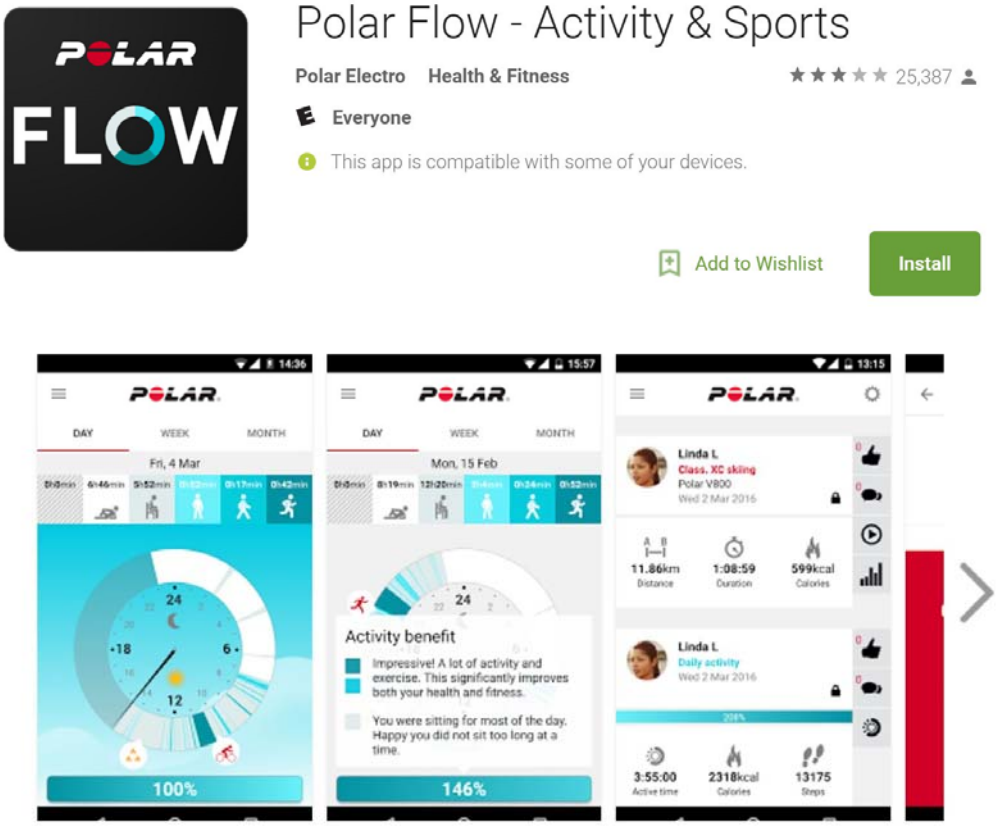


(https://www.rei.com/product/101918/polar-a360-activity-tracker-and-heart-rate-monitor)

CONNECTIVITY

Easy wireless sync via Bluetooth® Smart with the Polar Flow app
Micro USB connector for charging and data sync with PC or Mac via Polar FlowSync
Compatible with:
* Computer running Mac OS X10.6 or later and Windows XP, 7, 8, 10
* Mobile phones running iOS7 or later and Android 4.3 or later
* Polar Balance smart scale
* Polar H7 heart rate sensor
* Apple Health Kit, Google Fit, MyFitnessPal (iOS users) and MapMyFitness
* All compatible phones available here

(https://www.polar.com/us-en/products/sport/A360)



Note: This app is a companion for the Polar Loop, Polar Loop 2, Polar Loop Crystal, Polar A300, Polar A360, Polar M200, Polar M400, Polar M450, Polar M600 and Polar V800.

You'll also need a compatible smartphone that uses Android 4.3 or later. Check the full list of matching devices at www.polar.com/ble. Please also make sure you always use the latest firmware version of your Polar device.

Follow your training and activity with the Polar Flow app and instantly see your achievements. With this app you can see all of your training and activity data on your phone on the go, and sync them wirelessly to the Polar Flow web service. Loop, Loop 2, Loop Crystal, A300, A360, M200, M400, M450* and V800 all sync with the Polar Flow app using Bluetooth Smart.

(https://play.google.com/store/apps/details?id=fi.polar.polarflow&hl=en)

Bluetooth	Bluetooth is a wireless communication link, operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.

(Bluetooth V4.0 Spec)

1.1.1 Bluetooth Compliance Requirements

Rev	Date	Comments
4.0	June 30 2010	Updated to support Low Energy, ATT, and GATT support for BR/EDR, and to enable High Speed Controller Subsys-tems.
3.0 + HS	April 21 2009	Updated to include support for the Alternative MAC/PHY feature and High Speed Core Configuration.
v2.1 + EDR	July 26 2007	No content changes. Updates to the Table of Contents.
v2.0 + EDR	Oct 15 2004	This version of the specification is intended to be a sepa-rate Bluetooth Specification that has all the functional char-acteristics of the v1.2 Bluetooth Specification that adds the Enhanced Data Rate (EDR) feature which required changes to Volume 0, Part A, Master Table of Contents.
v1.2	Nov 05 2003	This Part was moved from the Core volume. No content changes been made to this document since v1.1.

(Bluetooth V4.0 Spec)

2 FREQUENCY BANDS AND CHANNEL ARRANGEMENT

The LE system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The LE system uses 40 RF channels. These RF channels have center frequencies 2402 + k * 2 MHz, where k = 0, ..., 39.

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, … ,39

Table 2.1: Operating frequency bands

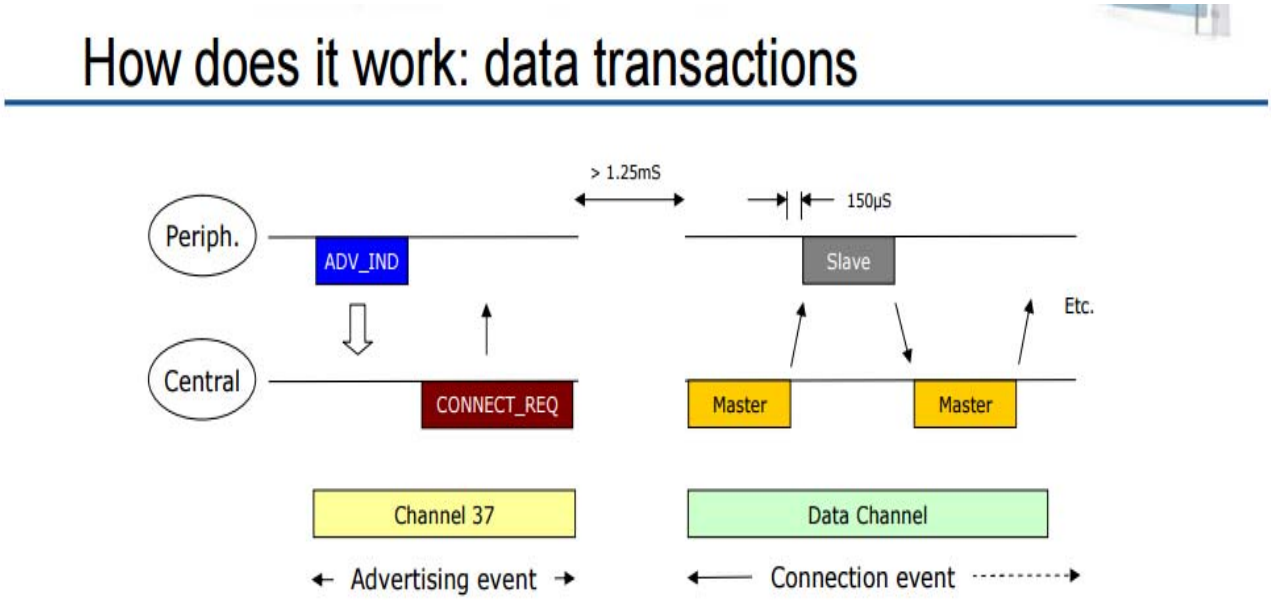
(Bluetooth V4.0 Spec)

1.2 OVERVIEW OF BLUETOOTH LOW ENERGY OPERATION

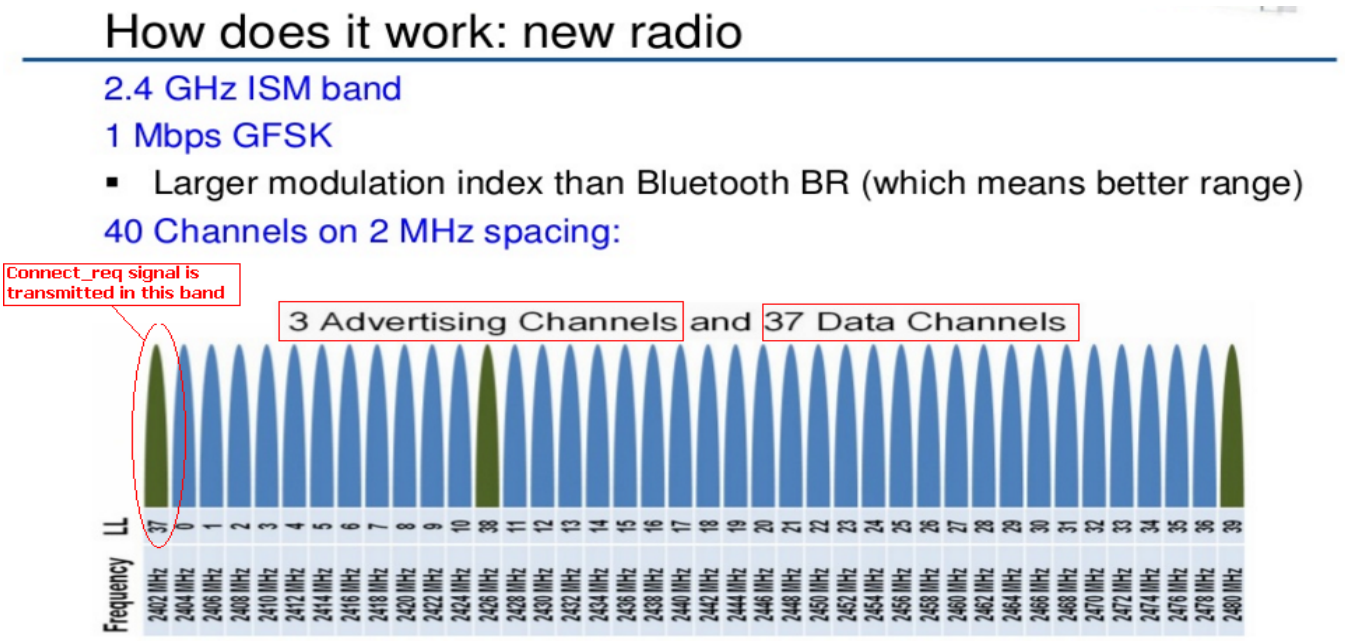
Like the BR/EDR radio, the LE radio operates in the unlicensed 2.4 GHz ISM band. The LE system employs a frequency hopping transceiver to combat interference and fading and provides many FHSS carriers. LE radio operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The symbol rate is 1 Megasymbol per second (Ms/s) supporting the bit rate of 1 Megabit per second (Mb/s).

LE employs two multiple access schemes: Frequency division multiple access (FDMA) and time division multiple access (TDMA). Forty (40) physical channels, separated by 2 MHz, are used in the FDMA scheme. Three (3) are used as advertising channels and 37 are used as data channels. A TDMA based polling scheme is used in which one device transmits a packet at a predetermined time and a corresponding device responds with a packet after a predetermined interval.

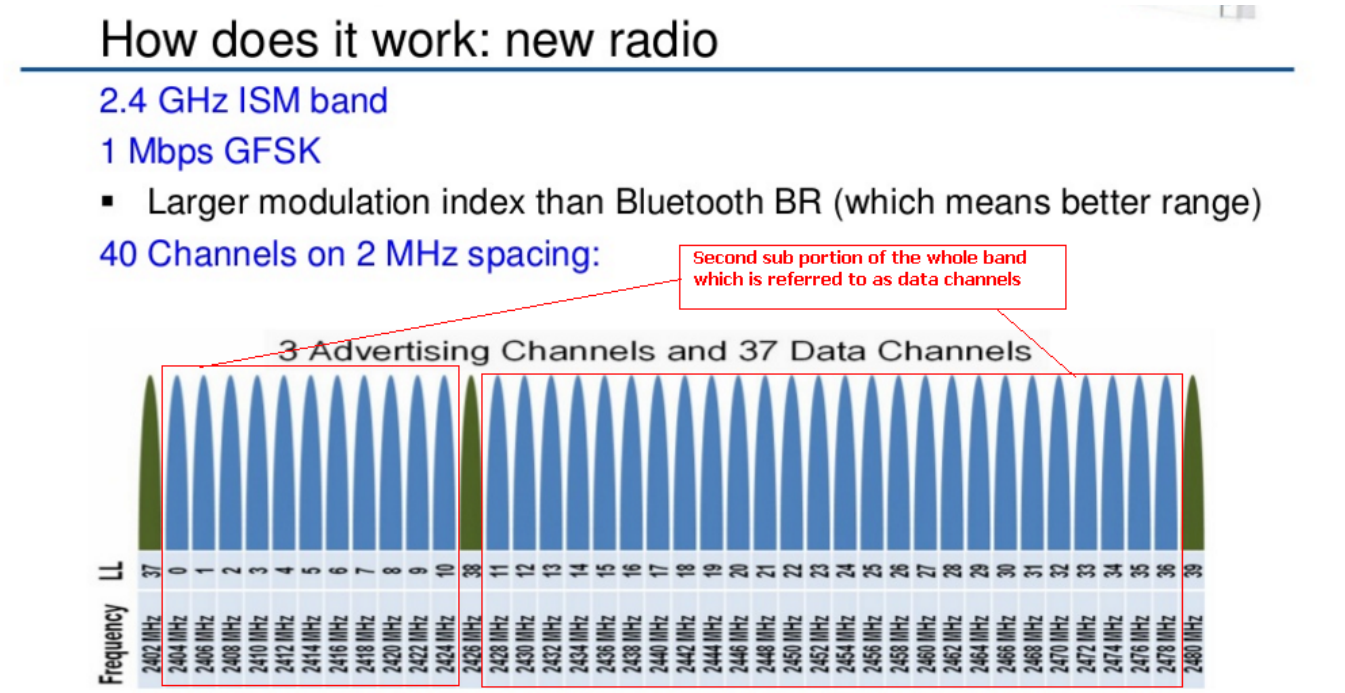
(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)



(Bluetooth V4.0 Spec)

77. Based on current information and belief, the wireless system comprises a first mobile station (e.g., the accused product) and a second mobile station (e.g., phone, tablet, or

other mobile device). Both are meant to communicate with each other via the Bluetooth v4.0 protocol.

78. Based on current information and belief, the accused product is configured to select a first portion of a radio frequency (RF) band (2.4 GHz-2.4835 GHz of ISM Band) to carry communications (via Bluetooth V4.0 protocol) between the accused product and the second mobile station(e.g., phone, tablet, or other mobile device).

1.4 PHYSICAL CHANNEL

As specified in Part A, Section 2, 40 RF Channels are defined in the 2.4GHz ISM band. These RF Channels are allocated into two LE physical channels: advertising and data. The advertising physical channel uses three RF channels for discovering devices, initiating a connection and broadcasting data. The data physical channel uses up to 37 (see Section 4.5.8) RF channels for communication between connected devices. Each of these RF Channels is allocated a unique channel index (see Section 1.4.1).

(Bluetooth V4.0 Spec)

79. Based on current information and belief, the accused product transmits a first request signal (Connect_Req signal) on a first sub-portion (e.g., double sided spectrum with centre frequency 2.402 GHz, also indexed as channel 37, which is an advertising channel) of the first portion(2.4 GHz-2.4835 GHz) of the RF band directly to the second mobile station(e.g., phone, tablet, portable speaker, headphones or any mobile device) to request communications between the first mobile station(e.g., the accused product) and the second mobile station (e.g., phone, tablet, portable speaker, headphones or any mobile device). The connection request signal is an advertising channel PDU with PDU bit type 0101, the advertising channel PDU is sent over advertising channel (first sub portion). Below is the packet structure of request signal sent by first mobile station (e.g., accused product) to second mobile station.

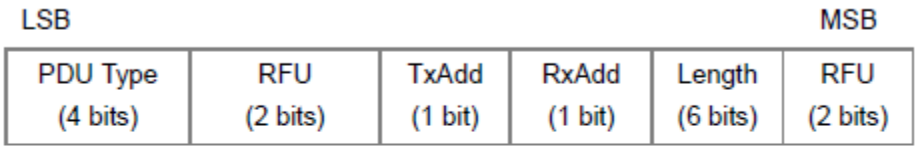
2.3 ADVERTISING CHANNEL PDU

The advertising channel PDU has a 16-bit header and a variable size payload. Its format is as shown in Figure 2.2. The 16 bit Header field of the advertising channel PDU is as shown in Figure 2.3.

LSB MSB

Header (16 bits)	Payload (as per the Length field in the Header)

(Bluetooth V4.0 Spec)



LSB					MSB
PDU Type (4 bits)	RFU (2 bits)	TxAdd (1 bit)	RxAdd (1 bit)	Length (6 bits)	RFU (2 bits)

Figure 2.3: Advertising channel PDU Header

The PDU Type field of the advertising channel PDU that is contained in the header indicates the PDU type as defined in Table 2.1.

(Bluetooth V4.0 Spec)

PDU Type $b_3b_2b_1b_0$	Packet Name
0000	ADV_IND
0001	ADV_DIRECT_IND
0010	ADV_NONCONN_IND
0011	SCAN_REQ
0100	SCAN_RSP
0101	CONNECT_REQ
0110	ADV_SCAN_IND
0111-1111	Reserved

Table 2.1: Advertising channel PDU Header's PDU Type field encoding

(Bluetooth V4.0 Spec)

2.3.3 Initiating PDUs

The following advertising channel PDU Type is called the initiating PDU:

- CONNECT_REQ

This PDU is sent by the Link Layer in the Initiating State and received by the Link Layer in the Advertising State.

2.3.3.1 CONNECT_REQ

The CONNECT_REQ PDU has the Payload as shown in Figure 2.10. TxAdd in the Flags field indicates whether the initiator's device address in the InitA field is public (TxAdd = 0) or random (TxAdd = 1). The RxAdd in the Flags field indicates whether the advertiser's device address in the AdvA field is public (RxAdd = 0) or random (RxAdd = 1).

Payload		
InitA (6 octets)	AdvA (6 octets)	LLData (22 octets)

Figure 2.10: CONNECT_REQ PDU payload

The format of the LLData field is shown in Figure 2.11.

(Bluetooth V4.0 Spec)

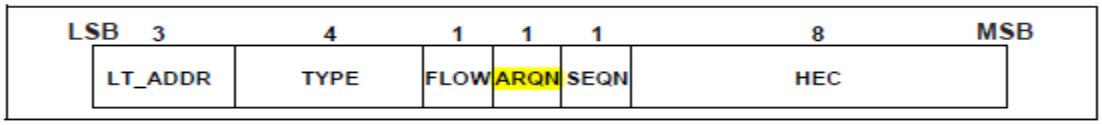
80. Based on current information and belief, the accused product establishes in response to receiving a first acknowledge signal from the second mobile station, a direct communication link between first the mobile station and the second mobile station on the first portion of RF band(2.4 GHz-2.4835 GHz of ISM band) and start exchanging data packets of the format shown below.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
- ARQN: 1-bit acknowledge indication
- SEQN: 1-bit sequence number
- HEC: 8-bit header error check

The total header, including the HEC, consists of 18 bits, see Figure 6.8 on page 115, and is encoded with a rate 1/3 FEC (not shown but described in Section 7.4 on page 139) resulting in a 54-bit header. The LT_ADDR and TYPE fields shall be sent LSB first.



(Bluetooth V4.0 Spec)

2.4 DATA CHANNEL PDU

The Data Channel PDU has a 16 bit header, a variable size payload, and may include a Message Integrity Check (MIC) field.

The Data Channel PDU is as shown in Figure 2.12.

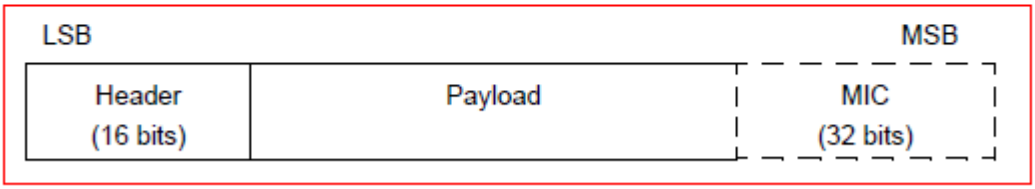
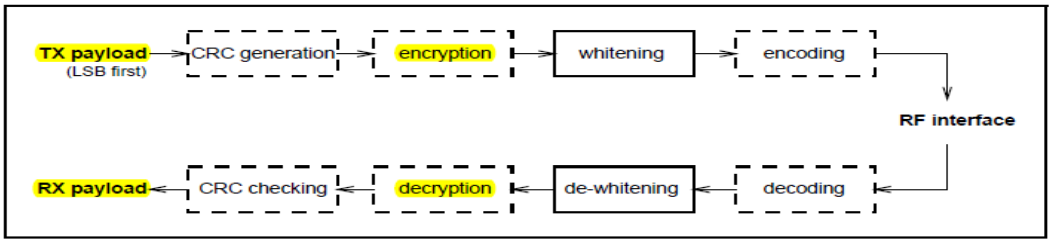


Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

81. Based on current information and belief, the accused product encrypts the message using the public encryption key to generate an encrypted message, provide the encrypted message to the second mobile station so that the second mobile station may decrypt the encrypted message using the private encryption key and extract the Ckey (common key), wherein the message exchanged between the accused product and the second mobile stations are encrypted using the Ckey (common key) In a public private key system a receiver receives an encrypted message and decrypts the same with a private key.



(Bluetooth V4.0 Spec)

Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.
Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.

(Bluetooth V4.0 Spec)

A private key is used to decrypt the encrypted message.

Term	Definition
DHKey	Diffie Hellman key
Ex	Check value from device X
f1( )	Used to generate the 128-bit commitment values Ca and Cb
f2( )	Used to compute the link key and possible other keys from the DHKey and random nonces
f3( )	Used to compute check values Ea and Eb in Authentication Stage 2
g( )	Used to compute numeric check values
h2( )	Used to compute Generic AMP and Dedicated AMP keys
IOcapA	IO capabilities of device A
IOcapB	IO capabilities of device B
LK	Link Key
Nx	Nonce (unique random value) from device X
Nxi	i^{th} nonce (unique random value) from device X. Only used in the passkey entry protocol
PKx	Public Key of device X
rx	Random value generated by device X
rxi	Bit i of the random value rx. Only used in the passkey entry protocol
SKx	Secret (Private) Key of device X
Vx	Confirmation value on device X. Only used in the numeric compare protocol.
X	BD_ADDR of device X

(Bluetooth V4.0 Spec)

When in Simple Pairing debug mode, the Link Manager shall use the following Diffie Hellman private / public key pair:

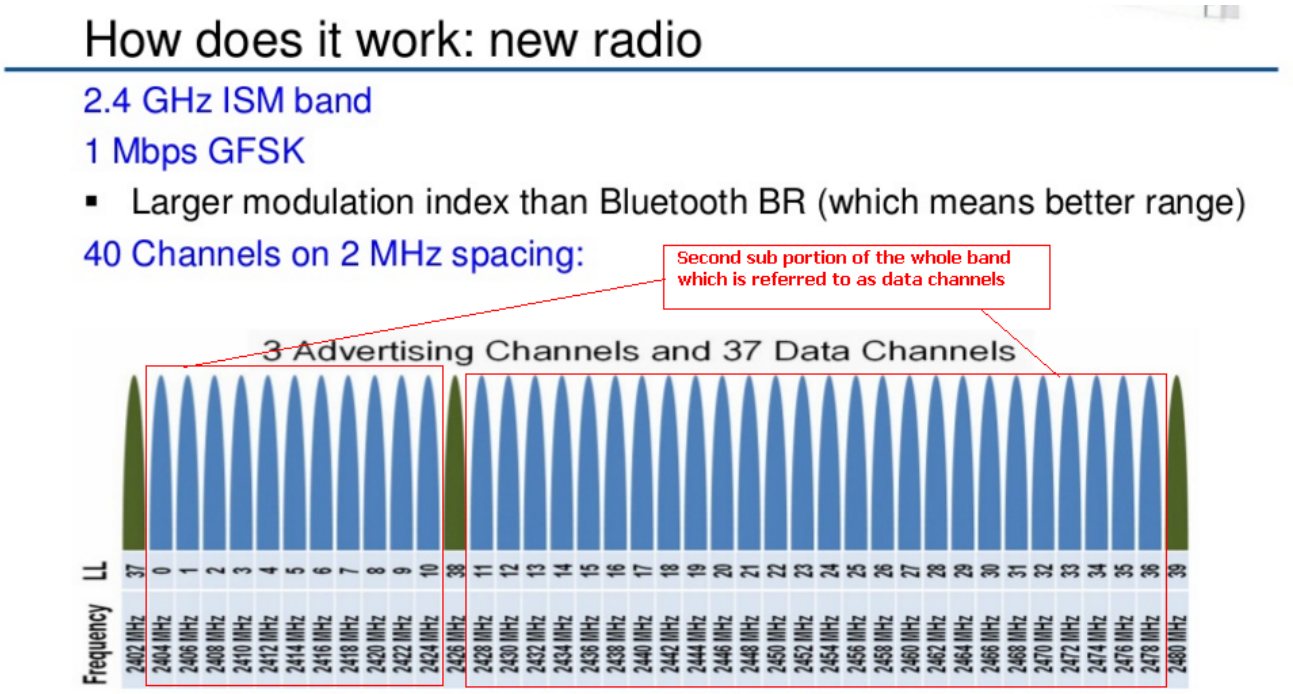
- Private key: 07915f86918ddc27005df1d6cf0c142b625ed2eff4a518ff
- Public key (X): 152070099844 21a6586f9fc3fe7e4329d2809ea51125f8ed
- Public key (Y): b09d42b81bc5bd009f79e4b59dbbaa857fca856fb9f7ea25

(Bluetooth V4.0 Spec)

The lifetime of a temporary link key is limited by the lifetime of the current session – it shall not be reused in a later session. Typically, in a point-to-multipoint configuration where the same information is to be distributed securely to several recipients, a common encryption key is useful. To achieve this, a special link key (denoted master key) may temporarily replace the current link keys. The details of this procedure are found in Section 3.2.6 on page 1069.

(Bluetooth V4.0 Spec)

82. Based on current information and the belief, the second mobile station transmits a first acknowledgement signal after receiving the first request signal Connect_Req signal).Thereafter, the accused product directly receives a first acknowledge signal on a second sub-portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) of the first portion of the RF band (2.4 GHz-2.4835 GHz of ISM band) to acknowledge the first request signal (Connect_Req signal). The second sub portion (formed of centre frequencies ranging from: 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz) is used to receive the acknowledgement signal.



The connectable directed advertising event type allows an initiator to respond with a connect request. An initiator may send a connect request (CONNECT_REQ PDU) to request the Link Layer to enter the Connection State.

(Bluetooth V4.0 Spec)

As is mentioned below, Bluetooth uses an acknowledgment scheme in which for every packet received, an acknowledgement signal is sent to the source.

Bluetooth uses a fast, unnumbered acknowledgment scheme. An ACK (ARQN=1) or a NAK (ARQN=0) is returned in response to the receipt of previously received packet. The slave shall respond in the slave-to-master slot directly following the master-to-slave slot unless the slave has scatternet commitments in that timeslot; the master shall respond at the next event addressing the same slave (the master may have addressed other slaves between the last received packet from the considered slave and the master response to this packet). For a packet reception to be successful, at least the HEC must pass. In addition, the CRC must pass if present.

The BR/EDR Baseband, LE Link Layer, and AMP MAC layers provides the basic acknowledgement/repeat request (ARQ) protocol in Bluetooth. The L2CAP layer can optionally provide a further error detection and retransmission to the L2CAP PDUs. This feature is recommended for applications with requirements for a low probability of undetected errors in the user data. A further optional feature of L2CAP is a window-based flow control that can be used to manage buffer allocation in the receiving device. Both of these optional features augment the QoS performance in certain scenarios. Not all of the L2CAP capabilities are available when using the LE system.

6.4.4 ARQN

The 1-bit acknowledgment indication ARQN is used to inform the source of a successful transfer of payload data with CRC, and can be positive acknowledge ACK or negative acknowledge NAK. See Section 7.6 on page 141 for initialization and usage of this bit.

2.1.2.4 Link Controller

The link controller is responsible for the encoding and decoding of Bluetooth packets from the data payload and parameters related to the physical channel, logical transport and logical link.

The link controller carries out the link control protocol signaling in BR/EDR and link layer protocol in LE (in close conjunction with the scheduling function of the resource manager), which is used to communicate flow control and acknowledgement and retransmission request signals. The interpretation of these signals is a characteristic of the logical transport associated with the baseband packet. Interpretation and control of the link control signaling is normally associated with the resource manager's scheduler.

(Bluetooth V4.0 Spec)

Once the second mobile station receives connect_req signal it enters into the connection state where it transmits data on data channels (second sub portion of band formed of frequencies ranging from : 2.404 GHz to 2.424 GHz; and 2.428 GHz to 2.478 GHz).

4.5 CONNECTION STATE

The Link Layer enters the Connection State when an initiator sends a CONNECT_REQ PDU to an advertiser or an advertiser receives a CONNECT_REQ PDU from an initiator.

(Bluetooth V4.0 Spec)

Therefore the second mobile station sends an acknowledgement signal to the first mobile station after receiving connect_req. Since after receipt the connect_req by second mobile station the stations enters connection state mode, where all the signals are sent over data channel and the acknowledgement is sent over the data channels.

4.5.1 Connection Events

The Link Layer in the Connection State shall only transmit Data Channel PDUs (see Section 2.4) in connection events. The master and slave shall determine the data channel index for each connection event as defined in Section 4.5.8. The same data channel index shall be used for all packets in the connection event. Each connection event contains at least one packet sent by the master.

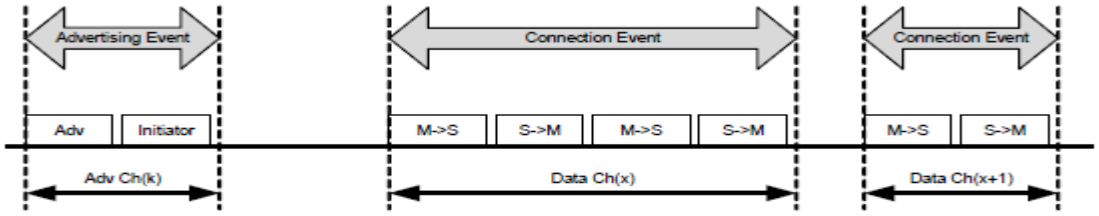
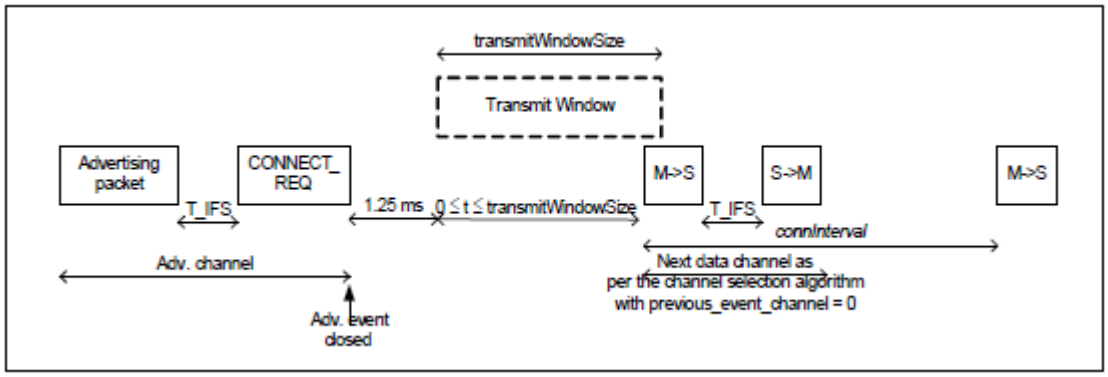


Figure 1.4: Connection Events



(Bluetooth V4.0 Spec)

Below is the packet structure of a packet sent over data channels.

6.4 PACKET HEADER

The header contains link control (LC) information and consists of 6 fields:

- LT_ADDR: 3-bit logical transport address
- TYPE: 4-bit type code
- FLOW: 1-bit flow control
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- SEQN: 1-bit sequence number
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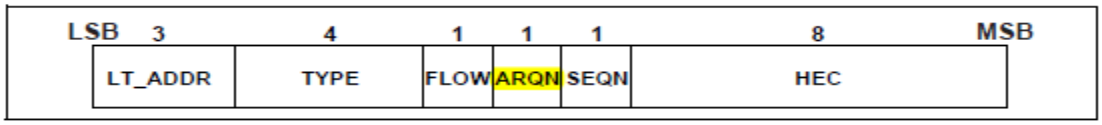

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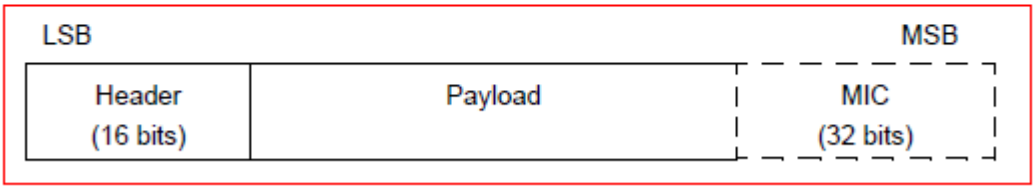

Figure 2.12: Data Channel PDU

(Bluetooth V4.0 Spec)

83. In the alternative, because the manner of use by Defendant differs in no substantial way from language of the claims, if Defendant is not found to literally infringe, Defendant infringes under the doctrine of equivalents.

84. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

85. In addition to what is required for pleadings in patent cases, and to the extent any marking was required by 35 U.S.C. § 287, Plaintiff and all predecessors in interest to the '095 Patent complied with all marking requirements under 35 U.S.C. § 287.

86. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that this Court enter:

1. A judgment in favor of Plaintiff that Defendant has infringed the '095 Patent;

2. A judgment and order requiring Defendant to pay Plaintiff its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the '095 Patent as provided under 35 U.S.C. § 284;

3. An award to Plaintiff for enhanced damages resulting from the knowing, deliberate, and willful nature of Defendant's prohibited conduct with notice being made at least as early as the date of the filing of this Complaint, as provided under 35 U.S.C. § 284;

4. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees; and

5. Any and all other relief to which Plaintiff may show itself to be entitled.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Respectfully Submitted,

ENCODITECH LLC

/s/ Papool S. Chaudhari

Dated: August 4, 2017 By: _____

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ATTORNEYS FOR PLAINTIFF
ENCODITECH LLC

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing document was filed electronically in compliance with Local Rule CV-5(b). As such, the foregoing was served on all counsel of record who have consented to electronic service. Local Rule CV-5. Pursuant to Fed. R. Civ. P. 5(d) and Local Rule CV-5, all others not deemed to have consented to electronic service will be served with a true and correct copy of the foregoing via e-mail this 4th day of August, 2017.

/s/ Papool S. Chaudhari

Papool S. Chaudhari