

EMC TECHNOLOGIES REPORT NUMBER M030507_Certification_Ginger_CalWB

ANNEX 1: LIFEBOOK GINGER BLUETOOTH THEORY OF OPERATION

LIFEBOOK GINGER BLUETOOTH QUALIFICATION BOARD CERTIFICATION



LIFEBOOK Ginger (S6120) Bluetooth

Theory of Operation

Bluetooth is an open standard developed by four OEM's (Ericsson, Nokia, IBM, and Toshiba) and one semiconductor company (Intel). The standard aims to define a globally accepted short distance (10m/30ft) radio communication protocol using a part of the radio frequency that is unlicensed (i.e. free to use) in most parts of the world. Bluetooth's key characteristic is that enabled devices can detect and communicate with other enabled devices within range – all without conscious user intervention.

1. Derivation of the pseudorandom hopping sequence.

Hopping sequence selection for a system is controlled by the master unit within a specific system. The sequence is selected by a combination of address codes and master unit system clock. The pseudo-random sequence is generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage with the result fed back to the input of the first stage.

This produces a pseudo-random sequence length of 31 bits for page and inquiry modes and provides for transition to a 511 bits pseudorandom sequence length for data mode of operation. The following are two examples of possible 79 channel hopping sequences with channels identified as 1 through 79. The channel numbering scheme starts with channel 2 at 2402 MHz with the 79th channel then appearing at 2480 MHz as channel 80.

Sequence a:

2,17,68,55,4,77,56,27,70,80,22,33,57,34,29,79,44,50,3,71,66,36,78,20,67,30,24,11,37,69,
23,7,41,38,63,14,31,59,40,13,6,25,65,15,61,73,58,47,19,28,54,76,74,48,52,75,5,42,64,72,
62,51,60,18,45,53,16,39,46,32,49,43,8,21,9,12,10,26,35

Sequence b:

50,6,41,57,64,14,42,33,79,3,20,38,56,69,75,21,80,23,31,40,45,68,32,28,4,15,34,59,71,61,
70,5,72,13,48,70,39,54,78,7,77,62,30,2,8,55,10,63,12,16,37,11,43,66,25,51,58,74,17,47,
9,29,65,19,53,18,52,36,27,26,44,22,49,24,35,60,73,76,67

2. Use of each frequency equally on average.

The FHS (frequency hop selection) packet is transmitted by a sending unit.

It contains UAP (upper address part)/LAP (lower address part) as well as clock information which is updated before retransmission in the inquiry state. When in hybrid substate, the UAP/LAP is used together with the clock to select the sequence. The output from the selection box constitutes a pseudo-random sequence covering 79 hops for US operation. For inquiry mode, the selection scheme chooses a segment of 32 hop frequencies from the 79 hops spanning about 64 MHz and visits these hops once in a random order. Next, a different 32-hop segment is chosen, etc. Refer to chapter 11 of the Bluetooth specification for a more through explanation of the hopping structure.

3. Receiver matching bandwidth and synchronization.

The receiver bandwidth is 1 MHz in the data mode. During connection establishment, the master identity and clock are transferred to the slave unit so it can synchronize to the channel.

The master clock in a slave unit is obtained by adding an offset to the internal clock of the slave. Also see above item 1 for details on the master clock and pseudo-random hopping channel selection.

4. More information.

The current Bluetooth specification version 1.1 is available to anyone at no cost from the Bluetooth SIG, Inc. website at <http://www.bluetooth.com/> . The specification is in two sections, the CORE specification and the Profile specification. Both sections together are approximately 1500 pages.



Compliant Portion Declaration

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1	Equipment		
	Brand name:	LifeBook S6120	
	Product type:	PROD	
	Identifier:	S6120	
	HW version:	001	SW version: 2.x

2	Identification of QPN		
	Ref. no. of QPN	119-CTCM	Date of listing: 2003-03-31

This Compliant Portion Declaration is only valid in conjunction with Annex A.

This Compliant Portion Declaration is an essential part of the *Bluetooth* qualification program and shows the acceptance of this product as a qualified *Bluetooth* device.

On the basis of the reviewed submitted compliance folder for the above mentioned product I certify that the product has passed all requirements to be listed as a *Bluetooth* end-product as defined in PRD 1.0.

Milpitas, March 31, 2003

place, date

[Original signed]

signature

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Annex A

Integrated Pre-Tested Components

ALPS UGXZ1-####, QPL# QPN_RB-02-02-27-a_r1, Bluetooth identifier B00524
Open Interface BlueMagic v2.0, QPL# QPN_RB-01-07-17-a_r2, Bluetooth identifier B00286
Fujitsu FMVNE8#####, QPL # QPN_041CTCMrev3, Bluetooth identifier B00354 (only BNEP)

Bluetooth Protocols

1. **Part A:** RF conformance as defined in the *Bluetooth* Core Specification, version 1.1, including all mandatory features and the following optional features: A.1/4, A.1/5, A.1/6
2. **Part B:** BB conformance as defined in the *Bluetooth* Core Specification, version 1.1, including all mandatory features and all optional features except: 23-channel hopping systems, SCO links from different Masters, Paging scan modes 1, 2 and 3 and Scatternet functionality.
3. **Part C:** LM conformance as defined in the *Bluetooth* Core Specification, version 1.1, including all mandatory features and all optional features except: Optional paging schemes.
4. **Part D:** L2CAP conformance as defined in the *Bluetooth* Core Specification, version 1.1 including all mandatory features and the following optional features: D.1/6 and D.1/7.
5. **Part E:** SDP conformance as defined in the *Bluetooth* Core Specification, version 1.1 including all mandatory features and all optional features in tables E.1 to E.8 (ICS version 0.92). The following attributes are implemented: E.9/2, E.9/5, E.9/6, E.9/9 and E.9/14.
6. **BNEP:** BNEP conformance as defined in the *Bluetooth* Network Encapsulation Protocol specification version 0.95a including all mandatory features (there are no optional features) are supported.
7. **AVCTP:** AVCTP conformance as defined in the Audio/Video Control Transport Protocol version 0.95b including all mandatory features and all optional features. Both device roles are supported.
8. **AVDTP:** AVDTP conformance as defined in the Audio/Video Distribution Transport Protocol version 0.95b including all mandatory features and the following optional features: 3/1, 3/2, 4/1, 4/2, 4/3, 5/1, 5/2, 5/3, 9/1, 9/2, 10/1, 10/2, 10/3, 11/1, 11/2, 11/3, 11/6, 14/2 and 14/3. Only the Source role is supported.

Bluetooth Profiles

1. **Part K1:** GAP conformance as defined in the *Bluetooth* Profile Specification, version 1.1 including all mandatory features and the following optional features: K:1.1/1 to K:1.1/4, K:1.1/6, K:1.1/7, K:1.2/1, K:1.2/3 to K:1.2/6, K:1.3/1 to K:1.3/6, K:1.4/3, K:1.4/6 and K:1.4/7.
2. **Part K2:** SDAP interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional features: K:2.2/3, K:2.2/4, K:2.2/6, K:2.2/8 and K:2.2/17.
3. **Part K5:** SPP conformance as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional features: K:5.2/4 to K:5.2/7, K:5.3/14, K:5.3/16, K:5.3/18, K:5.3/19, K:5.7/11 to K:5.7/14, K:5.7/16,

Annex A

- K:5.8/4 to K:5.8/7, K:5.9/14, K:5.9/16, K:5.9/18, K:5.9/19, K:5.13/11 to K:5.13/14 and K:5.13/16. Both device roles are supported.
4. **Part K6:** HS interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional features: K:6.2/4. Only the AG role is supported.
 5. **Part K7:** DUN interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and no optional features. Only the DT role is supported.
 6. **Part K8:** FAX interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and no optional features. Only the DT role is supported.
 7. **Part K9:** LAP interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional feature: K:9.3/14. Only the DT role is supported.
 8. **Part K11:** OPP interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional feature: K:11.2/9. Both device roles are supported.
 9. **Part K12:** FTP interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and no optional features. Both device roles are supported.
 10. **Part K13:** SYP interoperability as defined in the *Bluetooth* Profile Specification version 1.1 including all mandatory features and the following optional features: K:13.2/5, K:13.2/11, K:13.2/15, K:13.2/16, K:13.3/5, K:13.3/10, K:13.3/11 and K:13.3/16. Both device roles are supported.
 11. **PAN:** PAN interoperability as defined in the Personal Area Networking Profile Specification version 0.95a including all mandatory features and the following optional features: GN/2, GN/11, PANU/6 and PANU/7. The PANU and GN device roles are supported.
 12. **A2DP:** A2DP interoperability as defined in the Advanced Audio Distribution Profile version 0.95b including all mandatory features and no optional features. Only the Source role is supported.
 13. **AVRCP:** AVRCP interoperability as defined in the Audio/Video Remote Control Profile version 0.95b including all mandatory features and the following optional/conditional features: 2/8, 3/Category 1, 4/vendor unique, 8/8, 9/category 1 10/play, 10/stop, 10/forward, 10/backward and 10/vendor unique. Both device roles are supported.
 14. **GAVDP:** GAVDP conformance as defined in the Generic Audio/Video Distribution Profile version 0.95b including all mandatory features and the following optional/conditional features: 5/9, 5/10, 5/11, 5/12, 6/3, 6/4, 6/6, 6/9, 6/12, 6/13, 6/14, 10/4, 10/11, 10/12, 10/13, 10/14, 11/1, 11/6, 11/7, 11/9, 11/12 and 11/13. Both device roles are supported.

Revision history

Revision	Date	Changes
1	March 31, 2003	First release