IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

SAMSUNG ELECTRONICS CO., LTD.,

SAMSUNG ELECTRONICS AMERICA, INC.

Petitioners,

v.

MASSIVELY BROADBAND LLC.

Patent Owner.

_____

Case No. IPR2026-00033

U.S. Patent No. 9,667,337

_____

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,667,337

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LIST OF CHALLENGED CLAIMS

Claim	
1[pre]	A broadband wireless repeater or relay, comprising:
1[a]	at least one receiver or transceiver for signal or data reception from one or more devices;
1[b]	at least one transmitter or transceiver for signal or data transmission to one or more devices,
1[c]	wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and
1[d]	a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,
1[e]	wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,
1[f]	wherein said broadband wireless repeater or relay is connected or connectable to one or more network backbones for connecting said one or more wireless networks with said one or more network backbones,
1[g]	wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and
1[h]	wherein said controller is configured or configurable to perform or for performing at least one of: a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources.

Claim	
2	The broadband wireless repeater or relay of claim 1, wherein at least one of said one or more network backbones to which said controller is connected or connectable is a wired backbone.
3	The broadband wireless repeater or relay of claim 2, wherein said wired backbone is selected from a group consisting of T1, T3, DSL, cable, cable modem, fiber, optical cable, copper lines, coax, phone, ethernet, and internet.
4	The broadband wireless repeater or relay of claim 1, wherein at least one of said one or more network backbones to which said controller is connected or connectable is a wireless backbone.
5	The broadband wireless repeater or relay of claim 4, wherein said wireless backbone is selected from a group consisting of last mile wireless service, mesh network, LMDS, MMDS, WiMax, 802.16, 802.20, 802.11a/b/g, 802.15.3.a, RF, and baseband.
6	The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or configurable to perform a).
7	The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or configurable to perform b).
8	The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or configurable to perform network provisioning or monitoring.
9[pre]	The broadband wireless repeater or relay of claim 8, wherein the network provisioning or monitoring includes one or more of:
9[a]	i) bandwidth or delay provisioning of repeated or relayed transmissions,
9[b]	ii) application prioritization,
9[c]	iii) prioritizing, delaying or altering of data transmissions, traffic, or bandwidth, and
9[d]	iv) monitoring or measuring traffic from one or more devices, users or networks.
10[pre]	The broadband wireless repeater or relay of claim 1, wherein said controller is configured or configurable to perform or for performing all of:
10[a]	a);
10[b]	b); and
10[c]	c) network provisioning or monitoring.

Claim	
11	The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in half duplex.
12	The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in full duplex.
13	The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in simplex.
14	The broadband wireless repeater or relay of claim 1, wherein said signals or data received by said receiver or transceiver for receiving signals or data, or signals or data transmitted by said transmitter or transceiver for transmitting signals or data, or signals or data controlled by said controller include modified, stored, or delayed signals or data.
15	The broadband wireless repeater or relay of claim 1, wherein said controller is configured to cause said at least one transmitter or transceiver for transmitting signals or data to transmit modified received data or transmissions to one or more devices at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more.
16	The broadband wireless repeater or relay of claim 1, wherein said controller is configured to identify one or more devices in said one or more wireless networks.
17	The broadband wireless repeater or relay of claim 1, wherein said repeater or relay employs MIMO or adaptive antenna technology.
18	The broadband wireless repeater or relay of claim 1, wherein said controller is self-configurable.
19	The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in a moving platform environment.

Claim	
20	The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured to be integrated with or in communication with a vehicle, train, aircraft, or other moving platform.
21	The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an indoor environment.
22	The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an outdoor environment.
23	The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks selected from the group consisting of: a cellular network, an enterprise network, a wireless local area network, or a wireless personal area network.
24	The broadband wireless repeater or relay of claim 1, wherein said repeater or relay is configured to be integrated with or in communication with a device selected from the group consisting of a television, a telephone, a cellphone, a computer, a camera, a video system, a monitor, a power plug, a wall outlet, a watch, a cable modem, a vehicle or other moving platform, a game console, and an ultrawideband transceiver or device.
25	The broadband wireless repeater or relay of claim 1, wherein one or more of said receiver or transceiver for signal or data reception, said transmitter or transceiver for signal or data transmission, and said controller is embedded in one or more integrated circuit chips.
26	The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured or configurable for monitoring or measuring traffic passed through, received by or transmitted by said broadband wireless repeater or relay.

Claim	
27	The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured or configurable to modify at least some received signals or data from one or more devices, users or networks and transmit modified or delayed signals or data to at least one device, network or user via wireless communication.
28	The broadband wireless repeater or relay of claim 1, wherein said controller and one or more of said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission are integrated.
29[pre]	A broadband wireless repeater or relay, comprising:
29[a]	at least one receiver or transceiver for signal or data reception from one or more devices;
29[b]	at least one transmitter or transceiver for signal or data transmission to one or more devices,
29[c]	wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and
29[d]	a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,
29[e]	wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,
29[f]	wherein said repeater or relay employs MIMO or adaptive antenna technology,
29[g]	wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and
29[h]	wherein said controller is configured or configurable to perform or for performing at least one of:

Claim	
29[i]	a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and
29[j]	b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources.
30	The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform a).
31	The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform b).
32	The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform network provisioning or monitoring.
33[pre]	The broadband wireless repeater or relay of claim 32, wherein the network provisioning or monitoring includes one or more of:
33[a]	i) bandwidth or delay provisioning of repeated or relayed transmissions,
33[b]	ii) application prioritization,
33[c]	iii) prioritizing, delaying or altering of data transmissions, traffic, or bandwidth, and
33[d]	iv) monitoring or measuring traffic from one or more devices, users or networks.
34[pre]	The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform or for performing all of:
34[a]	a);
34[b]	b); and
34[c]	c) network provisioning or monitoring.
35	The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in half duplex.
36	The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in full duplex.

Claim	
37	The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in simplex.
38	The broadband wireless repeater or relay of claim 29, wherein said signals or data received by said receiver or transceiver for receiving signals or data, or signals or data transmitted by said transmitter or transceiver for transmitting signals or data, or signals or data controlled by said controller include modified, stored, or delayed signals or data.
39	The broadband wireless repeater or relay of claim 29, wherein said controller is configured to cause said at least one transmitter or transceiver for transmitting signals or data to transmit modified received data or transmissions to one or more devices at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more.
40	The broadband wireless repeater or relay of claim 29, wherein said controller is configured to identify one or more devices in said one or more wireless networks.
41	The broadband wireless repeater or relay of claim 29, wherein said controller is self-configurable.
42	The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in a moving platform environment.
43	The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured to be integrated with or in communication with a vehicle, train, aircraft, or other moving platform.
44	The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an indoor environment.

Claim	
45	The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an outdoor environment.
46	The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks selected from the group consisting of: a cellular network, an enterprise network, a wireless local area network, or a wireless personal area network.
47	The broadband wireless repeater or relay of claim 29, wherein said repeater or relay is configured to be integrated with or in communication with a device selected from the group consisting of a television, a telephone, a cellphone, a computer, a camera, a video system, a monitor, a power plug, a wall outlet, a watch, a cable modem, a vehicle or other moving platform, a game console, and an ultrawideband transceiver or device.
48	The broadband wireless repeater or relay of claim 29, wherein one or more of said receiver or transceiver for signal or data reception, said transmitter or transceiver for signal or data transmission, and said controller is embedded in one or more integrated circuit chips.
49	The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured or configurable for monitoring or measuring traffic passed through, received by or transmitted by said broadband wireless repeater or relay.
50	The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured or configurable to modify at least some received signals or data from one or more devices, users or networks and transmit modified or delayed signals or data to at least one device, network or user via wireless communication.
51	The broadband wireless repeater or relay of claim 29, wherein said controller and one or more of said at least one receiver or transceiver for signal or data reception and said at least one

Claim	
	transmitter or transceiver for signal or data transmission are integrated.
52[pre]	A broadband wireless repeater or relay, comprising:
52[a]	at least one receiver or transceiver for signal or data reception from one or more devices;
52[b]	at least one transmitter or transceiver for signal or data transmission to one or more devices,
52[c]	wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and
52[d]	a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,
52[e]	wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,
52[f]	wherein said broadband wireless repeater or relay is connected or connectable to one or more network backbones for connecting said one or more wireless networks with said one or more network backbones,
52[g]	wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices,
52[h]	wherein said repeater or relay is configured such that when in a network which includes one or more devices which can transmit or receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more at least one of said one or more devices has at least one of
52[i]	a higher data rate,
5[j]	a greater coverage distance,
52[k]	higher quality of transmission or reception,

Claim	
52[l]	less interference, and
52[m]	an improved ability to control its capacity,
52[n]	than if said repeater or relay was not present in said network.
53	The broadband wireless repeater or relay of claim 52, wherein said repeater or relay is configured such that said at least one of said one or more devices has a higher data rate than if said repeater or relay was not present in said network.
54	The broadband wireless repeater or relay of claim 52, wherein said repeater or relay is configured such that said at least one of said one or more devices has a greater coverage distance than if said repeater or relay was not present in said network.
55	The broadband wireless repeater or relay of claim 52, wherein said repeater or relay is configured such that said at least one of said one or more devices has higher quality of transmission or reception than if said repeater or relay was not present in said network.
56	The broadband wireless repeater or relay of claim 52, wherein said repeater or relay is configured such that said at least one of said one or more devices has less interference than if said repeater or relay was not present in said network.
57	The broadband wireless repeater or relay of claim 52, wherein said repeater or relay is configured such that said at least one of said one or more wireless networks has an improved ability to control its capacity than if said repeater or relay was not present in said one or more wireless networks.
58[pre]	A broadband wireless repeater or relay, comprising:
58[a]	at least one receiver or transceiver for signal or data reception from one or more devices;
58[b]	at least one transmitter or transceiver for signal or data transmission to one or more devices,
58[c]	wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and
58[d]	a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,

Claim	
58[e]	wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,
[58f]	wherein said repeater or relay employs MIMO or adaptive antenna technology,
58[g]	wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and
58[h]	wherein said repeater or relay is configured such that when in a network which includes one or more devices which can transmit or receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more at least one of said one or more devices has at least one of
58[i]	a higher data rate,
58[j]	a greater coverage distance,
58[k]	higher quality of transmission or reception,
58[l]	less interference, and
58[m]	an improved ability to control its capacity,
58[n]	than if said repeater or relay was not present in said network.
59	The broadband wireless repeater or relay of claim 58, wherein said repeater or relay is configured such that said at least one of said one or more devices has a higher data rate than if said repeater or relay was not present in said network.
60	The broadband wireless repeater or relay of claim 58, wherein said repeater or relay is configured such that said at least one of said one or more devices has a greater coverage distance than if said repeater or relay was not present in said network.
61	The broadband wireless repeater or relay of claim 58, wherein said repeater or relay is configured such that said at least one of said one or more devices have higher quality of transmission or reception than if said repeater or relay was not present in said network.

Claim	
62	The broadband wireless repeater or relay of claim 58, wherein said repeater or relay is configured such that said at least one of said one or more devices has less interference than if said repeater or relay was not present in said network.
63	The broadband wireless repeater or relay of claim 58, wherein said repeater or relay is configured such that said at least one of said one or more wireless networks has an improved ability to control its capacity than if said repeater or relay was not present in said one or more wireless networks.

I. INTRODUCTION

Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, LLC ("Petitioner") request *Inter Partes* Review of claims 1-63 of U.S. Patent No. 9,667,337 ("'337 patent") assigned to Massively Broadband LLC. ("Patent Owner".) The '337 patent is directed to "[a]n ultrawideband radio transceiver/repeater [that] provides a low cost infrastructure solution that merges wireless and wired network devices." (EX1001, Abstract.) As demonstrated below, transceiver/repeater devices using wide frequency bandwidths was ubiquitous in the prior art, and the '337 patent claims no non-obvious features or implementation.

II. MANDATORY NOTICES

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

The real parties-in-interest for Petitioner are Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

1. Related Patent Office Proceedings

The '337 patent is in the same family as U.S. Patent Nos. 7,676,194, 8,923,754, 10,224,999, and 10,797,783. Petitioner has filed IPR petitions against U.S. Patent Nos. 7,676,194 (IPR2026-00035), 8,923,754 (IPR2025-01595), 10,224,999 (IPR2025-01594), and 10,797,783 (IPR2025-01605).

2. Related Litigation

Patent Owner is currently asserting the '337 patent against Petitioner in *Massively Broadband LLC. v Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, Case No. 2:25-cv-00608-JRG (E.D. Tex.)

C. Lead and Backup Counsel and Service Information (37 C.F.R. §§ 42.8(b)(3)-(4))

Electronic service may be made on the email addresses identified below and in the accompanying Power of Attorney. Petitioner consents to electronic service at the email addresses listed in the table below and at:

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D. Payment of Fees (37 C.F.R. § 42.15(a))

The Office is authorized to charge the fee required for this Petition (and any additional fees) to Deposit Account No. 50-5708.

E. Requirements For *Inter Partes* Review (37 C.F.R. §§ 42.101(A)-(C), 42.104(A), and 42.018)

Petitioner certifies that the '337 patent is available for *inter partes* review, that Petitioner is not barred or estopped from challenging the '337 claims on the grounds identified herein, and that the prohibitions of 35 U.S.C. §§ 315(a)-(b) are inapplicable.

III. STATEMENT OF RELIEF REQUESTED AND IDENTIFICATION OF CHALLENGE (37 C.F.R. § 42.104(B))

Petitioner respectfully requests that *inter partes* review of claims 1-63 ("Challenged Claims) on the following grounds:

Ground	Basis	References	Claims
1	§103	Ganz and Larrick in further view of Roese	1-16, 20, 24-28
2	§103	Ganz, Larrick, and Roese in further view of Perlman	18-19, 21-22
3	§103	Ganz, Larrick, and Roese in further view of Engels	17, 23, 29-40, 43, 46-51
4	§103	Ganz, Larrick, Roese, and Engels in further view of Perlman	41-42, 44-45, 52-63

IV. BACKGROUND

A. '337 Patent

1. Earliest Priority Date

The '337 patent is a pre-AIA patent whose earliest priority date is August 22, 2003 via U.S. Provisional Application Nos. 60/498,324 and 60/496,913. (EX1002, ¶40.)

2. Specification

The '337 patent relates to an ultrawideband radio transceiver/repeater that merges wired and wireless network devices while providing connection to the plant, flexible repeater capabilities, network security, and traffic monitoring and flow.

(EX1001, Abstract.) (EX1002, ¶41.)

The ultrawideband repeater described in the '337 patent "serves to 'repeat' data signals coming from one or many devices so that other devices, located farther away from the 'source' will be able to access the internet, Cable TV, Satellite source, phone/DSL line, or other broadband 'plant' source via the repeater." (*Id.*, 6:57-62.) (EX1002, ¶42.)

The patent describes that "[u]ltrawideband technologies are about to become mainstream, and are described in" various patent applications and publications. (EX1001, 2:12-19.) The patent also describes that "[t]he IEEE 802.15.3 standards bodies have been developing Physical (PHY) and MAC layer standards for dynamic channel selection and repeater service for UWB, which falls under the general IEEE 802.15.3 standards body." (*Id.*, 2:19-23.) The patent contends that "the presently proposed 802.15.3 standard[] is not adequate to provide one or more of sufficient security, proper traffic filtering, bandwidth provisioning, network management features, or flexibility of networks that can be installed or controlled easily by a consumer. That is to say, the current repeater operation contemplated by 802.15.3 and proposed UWB devices is based on the assumption that a single chip can perform necessary repeater functions, but this functionality alone will not be adequate for the rapid emergence of UWB and the onslaught of wireless data that is certain to occur." (*Id.*, 2:44-55.) (EX1002, ¶43.)

In addition, the patent describes that "IEEE 802.15.3a, the Ultrawideband Physical Layer standard committee, is working on creating a standard that may either be Multiband OFDM transmission (MBOA), with 500 MHz channels, or a Direct Sequence Spread Spectrum impulse radio standard that has broader channel bandwidths (UWB Forum)." (EX1001, 2:55-60.) Moreover, ***the patent describes that UWB chips capable of 100 megabits per second were already commercially available*** (*id.*, 3:5-8; emphasis added) and that mesh networking will provide efficient network paths that allow very high data rates across the internet (*id.*, 3:8-11). (EX1002, ¶44.)

Repeaters are "well known in the art, and they have been manufactured for decades in the cellular and PCS industries, and more recently, … for the IEEE 802.11a/b marketplace [and] for IEEE 802.11g wireless LAN WiFi standard." (EX1001, 3:27-35.) (EX1002, ¶45.)

Contrary to the FCC defining ultrawideband as larger than 500 MHz,[1] the patent defines "ultrawideband" as "any type of electromagnetic signals that have an instantaneous or overall occupied bandwidth of 100 MHz or more and that are used to communicate or to position-locate between 2 or more devices. Such wide

[1] FCC, First Report and Order 02-48. February 2002. The FCC published this formal definition in April 2002, prior to the earliest priority date of the patents.

bandwidths … generally implies a proportionally higher noise floor power level, which requires UWB devices generally to be physically closer in distant to each other in order to obtain a sufficiently strong signal to noise ratio (SNR)…. Thus, repeaters will become necessary to connect devices over greater distances than the range of a single UWB device." (EX1001, 4:2-19.) (EX1002, ¶46.)

In connection with FIG. 2, the ultrawideband repeater is stated to require careful signal processing that is able to null out noise and interference across the very wide bandwidth used by UWB such as noise from an undesired transmitter or attacker. (EX1001, 9:21-25.) (EX1002, ¶47.)

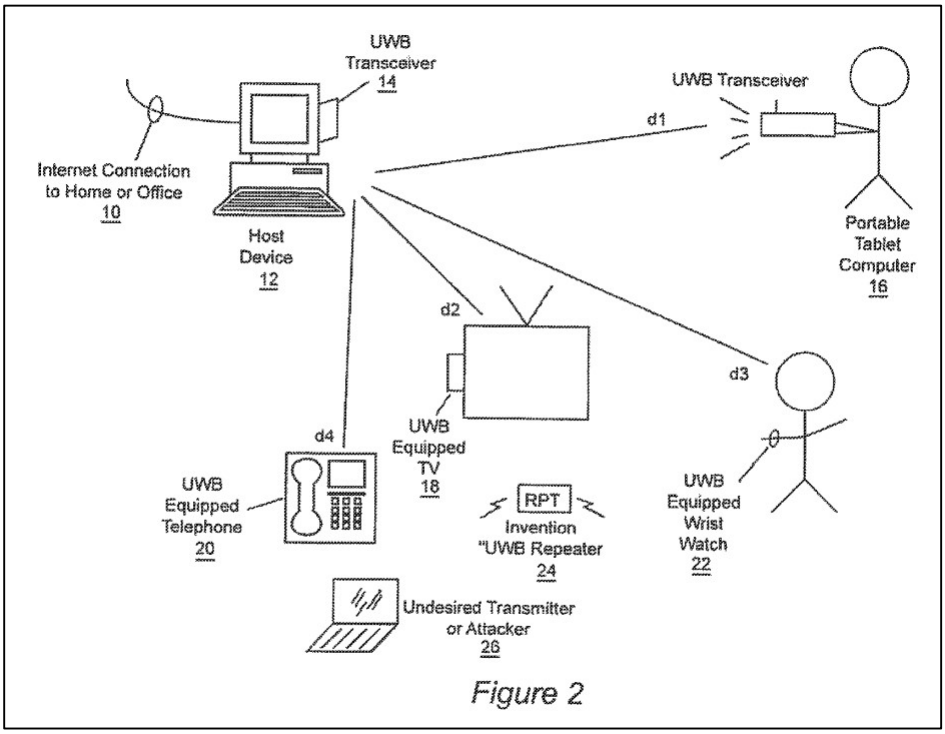


Figure 2

3. Prosecution History

The '337 patent was filed on November 13, 2014 as application 14/540,773,

and claims priority to provisional applications 60/498,324 and 60/496,913. (EX1002, ¶¶48.)

On October 20, 2016 an Office Action issued rejecting pending claims 45-50, 53-54, 57-59, 65-81, 84-85, 88-90, and 96-109. Claims 51-52, 55-56, 60-64, 82-83, 86-87, and 91-95 were objected to as being dependent upon a rejected base claim, but would otherwise be allowable if rewritten in independent form. (EX1004, October 20, 2016 Office Action.) (EX1002, ¶49.)

In response, applicant amended independent claim 45 (issued claim 1) to include the features of claims 51 and 52. Independent claim 80 (issued as claim 29) was amended to include the features of claims 82 and 83. The allegedly novel limitation in issued claims 1 and 29 is limitation 1[h] and 29[h-j] ("wherein said controller is configured or configurable to perform or for performing at least one of: a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources.") (EX1004, January 19, 2017 Response to Office Action.) (EX1002, ¶50.)

Claims 110 and 111 (issued as claims 52 and 58) were added as Markush claims with the features of claims 60-64 and 91-95, respectively (issued as claims

53-56 and 59-63). (EX1004, January 19, 2017 Response to Office Action.) The allegedly novel limitations of these claims is that at least one or more of the devices in the network has "a higher data rate" (52[i], 58[i]), "a greater coverage distance (52[j], 58[j]), "higher quality of transmission or reception" (52[k], 58[k]), "less interference" (52[l], 58[l]), and "an improved ability to control its capacity" (52[m], 58[m]) "than if said repeater or relay was not present in said network." (EX1002, ¶51.)

The claims were then allowed. (EX1004, February 3, 2017 Notice of Allowance.). (EX1002, ¶52.)

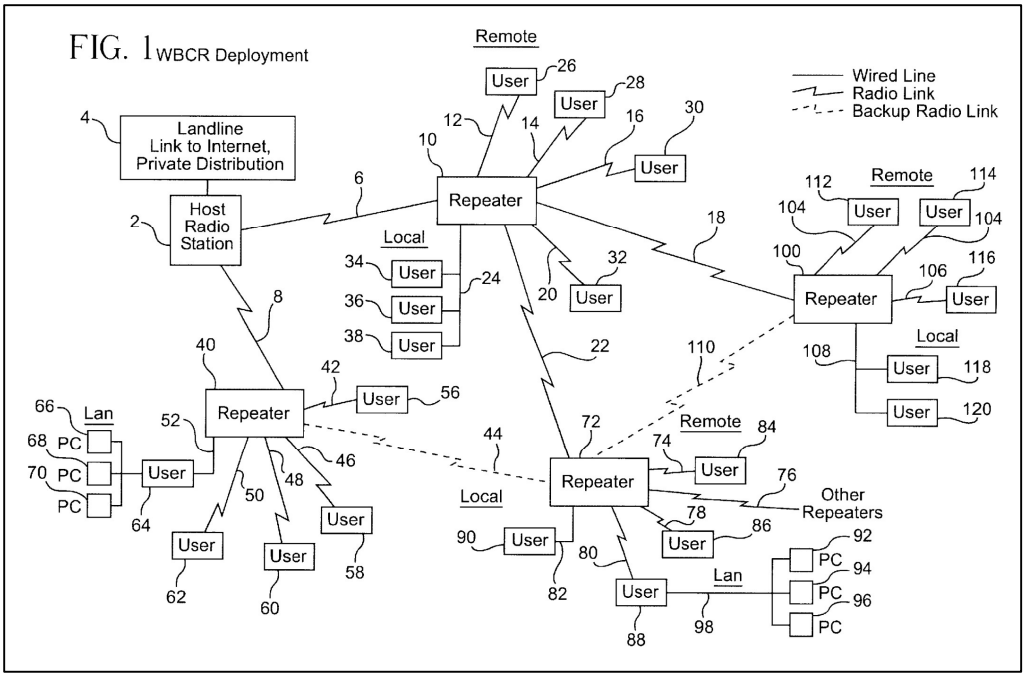
In other words, the Examiner found that the repeater functionality, the claimed bandwidth and data rates, the use of a controller, MIMO, and the use of the repeater to support connectivity and/or position location were found in the prior art. The examiner however allowed the claims because they included standard functions of wireless devices such as ignoring/filtering out some signal or data transmissions and instructing devices or networks to ignore/disregard some signal or data transmissions, and networks that have i) a higher data rate, ii) a greater coverage distance, iii) higher quality of transmission or reception, iv) less interference, and v) an improved ability to control its capacity than if the repeater or relay was not present in the network. As discussed below, each of these limitations were well-known in the art and would have been obvious to combine. (EX1002, ¶56.) (EX1002, ¶53.)

B. Asserted Prior Art

1. Ganz (EX1005)

U.S. 6,584,080 ("Ganz"), "*Wireless Burstable Communications Repeater*," was filed on January 14, 1999, and was published on June 24, 2003. It is prior art under pre-AIA § 102(a) and § 102(b). (EX1002, ¶54.)

Ganz discloses "[a] wireless high speed data communication system having a host radio station connected to a source of data. The host radio station transmits data to a radio repeater that is within a line of sight. The communication system may include numerous repeaters each of which is configured to communicate with each other within a line of sight." (EX1005, Abstract; emphasis added.) (EX1002, ¶55.)



2. Larrick (EX1007)

U.S. 7,209,523, "*Ultra-wideband Receiver and Transmitter*," was filed on

February 17, 1999, and was published on April 24, 2007. It is prior art under pre-AIA § 102(a). (EX1002, ¶57.)

Larrick discloses "[a] waveform-adaptive ultra-wideband (UWB) transmitter and noise-tracking UWB receiver for use in communications, object detection and radar applications…. The UWB transmitter exhibits well defined and controllable spectral characteristics. The UWB transmitter is capable of extremely high pulse repetition frequencies (PRFs) and ***data rates in the hundreds of megabits per second*** or more, frequency agility on a pulse-to-pulse basis allowing frequency hopping if desired, and extensibility from below HF to millimeter wave frequencies." (EX1007, Abstract) (EX1002, ¶58.)

In one described embodiment and as shown in FIG. 12B, "[a]n UWB transmitter using a low-level impulse generator and microwave bandpass filter was constructed which generated an L-band UWB signal at a center frequency of 1.5 GHz, ***with a 3 dB down bandwidth of 400 MHz***." (EX1007, 10:61-64.) (EX1002, ¶59.)

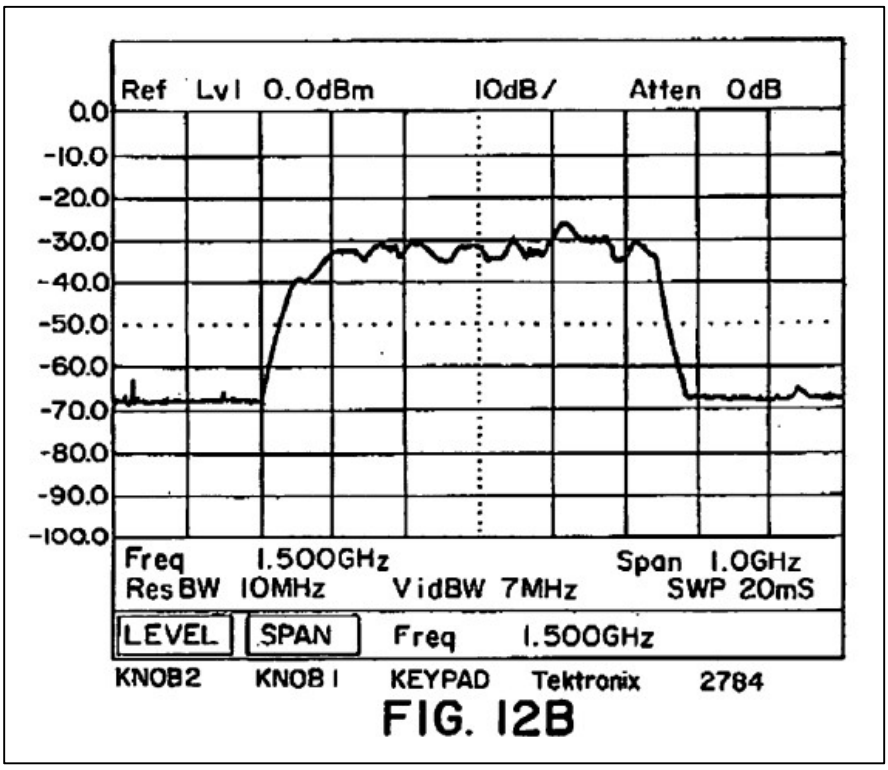


FIG. 12B

FIG. 8 shows the use of an amplifier 160 that amplifies the output of UWB source 130. (EX1007, 11:36-12:9.) (EX1002, ¶60.)

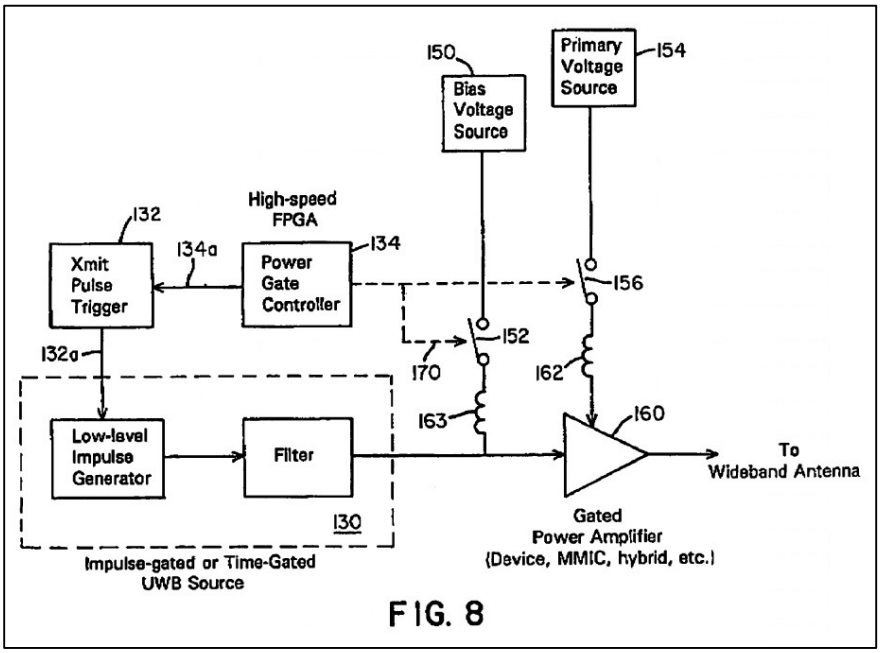


FIG. 8

3. Engels (EX1008)

Patent Cooperation Treaty Application WO 03/058850 ("Engels") was filed on January 6, 2003 and published on July 17, 2003. It is prior art under pre-AIA § 102(a). (EX1002, ¶62.)

Engels discloses "a wireless radio telecommunications system, an indoor-outdoor coupling device for coupling between a telecommunications network, such as a wireless or cable network and an indoor wireless network, especially a LAN, and a method for providing improved communications between the inside and outside of a building." (EX1008, 1:5-8.) (EX1002, ¶63.)

4. Perlman (EX1011)

U.S. Patent Application Pub. No. 2004/0160928 ("Perlman") was filed on May 9, 2003. It is prior art under pre-AIA § 102(e). (EX1002, ¶65.)

Perlman discloses "[a] network for wireless transmission of data" which "includes a source access point, a destination device and a plurality of wireless repeaters that provide a transmission link between the source access point and the destination device." (EX1011, Abstract.) (EX1002, ¶66.)

5. Roese (EX1012)

U.S. Pat. No. 7,295,556 was filed on February 28, 2003. It is prior art under pre-AIA § 102(e). (EX1002, ¶68.)

Roese discloses a "method for location discovery in a data network" where a

"router" "receiv[es] … connection information from a neighboring network device and determine[es] a physical location" of that router. (EX1012, Abstract.) (EX1002, ¶69.)

V. PERSON OF ORDINARY SKILL

A person of ordinary skill in the art as of the asserted priority date ("POSITA") had at least a Bachelor of Science in electrical engineering or a similar field and at least two years of practical experience in the field of wireless communication applications. More education can supplement for less practical experience, and vice versa. (EX1002, ¶71.)

Petitioner's expert, Dr. Mahon, met this level by the priority date. (EX1002, ¶72.)

VI. CLAIM CONSTRUCTION

No express constructions are required to find the '337 patent claims invalid. As relevant, Petitioner addresses the plain meaning of certain terms in the analysis for the presented Grounds. The challenged claims have not been construed in other proceedings. (EX1002, ¶¶73-74.)

VII. GROUND 1: Ganz and Larrick in Combination with Roese Renders Claims 1-16, 20, and 24-28 Obvious[2]

A. Overview and Motivation to Combine

As discussed in more detail below, Ganz teaches a wireless networking device that receives wireless data, processes that wireless data, and transmits wireless data. Ganz uses a wireless burstable communications repeater. (EX1005, Abstract.) Larrick similarly teaches a wireless networking device that contains an ultra-wideband transmitter and receiver, with data rates of at least 100 megabits per second and bandwidth between 100 and 500 MHz. (EX1002, ¶75.)

A POSITA would have been motivated to incorporate the teachings of Larrick to improve the Ganz system by allowing it to transmit and receive data using wider frequency bands and at higher data speeds. Ganz teaches a wireless repeater system for wirelessly receiving and transmitting data, and Larrick provides additional detail on how to use ultra-wide band frequency bandwidths and data speeds to wirelessly transfer data. The teachings of Ganz are complementary to Larrick, and a POSITA would have recognized that Larrick's teachings could be easily implemented into Ganz without technical challenge. (EX1002, ¶76.)

[2] Unless noted otherwise, all emphases in quotes and annotations to figures from prior art references are added.

Ganz addresses wireless burstable communications repeaters for creating network infrastructures while Larrick discloses an ultra-wideband (UWB) transmitter and receiver system with controllable spectral characteristics. Ganz, which discloses efficient spectrum utilization in a shared wireless environment, would benefit from Larrick's waveform-adaptive UWB transmitter which provides "well defined and controllable spectral characteristics." (EX1007, Abstract.) These technologies address different aspects of wireless communication that could naturally work together including Larrick's use of wider frequency bandwidths than those disclosed in Ganz. (EX1002, ¶77.)

The "wireless high speed data communication system" of Ganz (EX1005, Abstract), would benefit from Larrick's UWB technology which enables even faster data speeds such as "extremely high pulse repetition frequencies (PRFs) and data rates in the hundreds of megabits per second" (EX1007, Abstract) (EX1002, ¶78.)

Larrick's UWB technology, which offers waveform adaptation that could improve signal propagation in challenging environments, would be beneficial to Ganz which addresses communication problems where "extended coverage areas are desired and line-of-sight conditions do not exist." (EX1005, 1:62-63.) Like Ganz, Larrick arises in the field wireless communication networks and is addressed to increasing transmitting information wirelessly. (EX1007, Abstract.) (EX1002, ¶79.)

Enhanced Modulation Techniques

The combination would particularly benefit from the complementary modulation approaches described in both patents. Larrick introduces sophisticated UWB signal generation methods that would significantly enhance the Ganz system:

- Larrick's "waveform-adaptive" approach provides precise control over UWB signal characteristics through an "impulse-gated oscillator" that allows "precise control of radiated frequency" governed by "the choice of oscillator which has a known stable frequency." (EX1007, 5:62-65.)
- Larrick supports advanced modulation including phase modulation where "oscillator phase may also be controlled to generate an additional phase modulation." (EX1007, 5:67-6:1.)
- Larrick enables "frequency agility on a pulse-by-pulse basis allowing frequency hopping if desired" (EX1007, Abstract), which would enhance the frequency hopping capabilities already present in Ganz' system where "three different hopping sequence sets are established with twenty-six (26) hopping sequences per set." (EX1005, 7:21-23.)
- Larrick describes a "time-gated oscillator" approach using high-speed switches to create "a sub-nanosecond microwave burst" with controllable bandwidth. (EX1007, 15:1-9.) (EX1002, ¶80.)

These advanced modulation capabilities would pair effectively with Ganz'

network protocols, particularly the "burstable packet multi access/collision avoidance (BPMA/CA) protocol" (EX1005, 5:16-17) that Ganz uses to improve network efficiency. (EX1002, ¶81.)

Multi-User Capability and Spectral Efficiency

Ganz identifies inefficient spectrum utilization in conventional systems due to "polling" which leads to "time slots [going] unused when a polled radio has no data to transfer." (EX1005, 1:58-60.) Combining this with Larrick's ability to control "center frequency and bandwidth" (EX1007, 6:14-15) on a "pulse-by-pulse basis" (EX1007, 5:52) would create an advanced multiple access scheme where:

- Different users could be assigned different UWB center frequencies, enhancing Ganz' ability to support "multiple segments to be installed in a common geographical area without interfering with each other." (EX1005, 8:17-18.)
- The network could dynamically allocate bandwidth based on user requirements, improving on Ganz' goal of providing "high communication speeds" in a "multi-user (access) environment." (EX1005, 2:41-42.)
- Larrick's "well defined and controllable spectral characteristics" (EX1007, Abstract) would enhance Ganz' ability to segment networks where "data bandwidth can be increased beyond 1.5 Mb/s for higher data transfer rate." (EX1005, 8:39-40.) (EX1002, ¶82.)

Link Quality Assessment and Power Efficiency

Ganz describes sophisticated link testing where "control packets" with "sequence numbers" allow the system to "know whether packets were lost either on the way to the destination, or on the way back to the source node" (EX1005, 12:28-31). This capability would pair effectively with Larrick's adaptable UWB parameters to create a system that could dynamically adjust transmission parameters based on link quality. (EX1002, ¶83.)

Additionally, Larrick's "gated power amplifier" with "the unique feature of high power efficiency as the power amplifier is only turned on for approximately the duration of the UWB pulse" (EX1007, 6:42-45) would be particularly valuable in Ganz' repeater network, especially for remote installations. (EX1002, ¶84.)

Data Rate Advancement and Industry Trends

At the time of the '337 patent, a significant industry trend was toward higher data rates in wireless communication systems. Ganz' system specifically aims to overcome the "reduction of throughput by a factor of two" that occurs in half-duplex systems (EX1005, 1:19-20) and discusses achieving "information throughput in each segment is preferably at least 1.5 Mb/s, equal to a full dedicated T-1 line rate." (EX1005, 8:24-26.) However, Ganz acknowledges bandwidth limitations within specific frequency bands, noting that "with an 11-bit modulation sequence, a transmission is spread over a 20 MHz bandwidth." (EX1005, 8:26-27). (EX1002,

¶85.)

Larrick directly addresses these limitations by providing technology that enables "data rates in the hundreds of megabits per second or more" (EX1007, Abstract) and explicitly states that prior UWB systems had limitations that prevented higher data rates. (*E.g.*, EX1007, 5:41-44.) Larrick's UWB system operates with bandwidths substantially greater than those mentioned in Ganz, with examples showing bandwidths of "400 MHz" (EX1007, 10:63-64) and "over 2 GHz." (EX1007, 15:41-42.) (EX1002, ¶86.)

These significant improvements in data rate capabilities – from Ganz' 1.5 Mb/s to Larrick's "hundreds of megabits per second" – represent precisely the kind of technological advancement that would motivate a POSITA to combine these references. The substantially increased bandwidth of Larrick's UWB system (400 MHz and greater compared to Ganz' 20 MHz) would directly enable these higher data rates. (EX1002, ¶87.)

The combination of Ganz and Larrick would have a reasonable expectation of success. Larrick provides technical details for its ultra-wideband transmitter and receivers, explaining how they can operate at higher bandwidths and data rates. It would have been well-within the skill of an ordinary artisan to implement Larrick's teachings into Ganz' repeater systems. (EX1002, ¶88.)

In the analysis below, the combined prior art system will be referred to as

Ganz/Larrick. (EX1002, ¶89.)

Roese teaches various methods for locating the position of a wireless repeater using network information and using the location information within a network, such as to determine the location of user devices connected to the repeater. (EX1002, ¶90.)

A POSITA would have been motivated to incorporate the teachings of Roese to improve the Ganz system (along with its combination with Larrick) because of the utility of location information. As Roese itself teaches, location information "may be used in any of a variety of ways to improve configuration accuracy, control, and security," as well as "control or secure a device itself." (EX1012, 2:23-28.) Roese also teaches that "the device location can be used in any number of ways to enhance the operation of, and services provided by, the system," for example, "anywhere user credentials are required, the location of a device can be required." (*Id.*, 2:54-61.) Location information was also useful for network administrators to optimize coverage of wireless access points as well as perform location-aware handovers. For example, by knowing the location of itself and its neighbors as well as a user device, a wireless repeater/router could more optimally hand off the user device to a neighboring wireless access point. In addition, users of user devices would have found location information to be beneficial, such as when using mapping or emergency services. The techniques of Roese would have been particularly useful

at the time of the '337 patent when user devices were unlikely to have GPS. (EX1002, ¶91.)

A POSITA would have reasonably expected the combination to succeed. The methods described in Roese used conventional wireless network technologies and Roese provides significant detail on its implementation which was within the skill of an ordinary artisan. (EX1002, ¶92.)

B. Limitation-By-Limitation Analysis

1. Claim 1

a) 1[pre]: A broadband wireless repeater or relay, comprising:

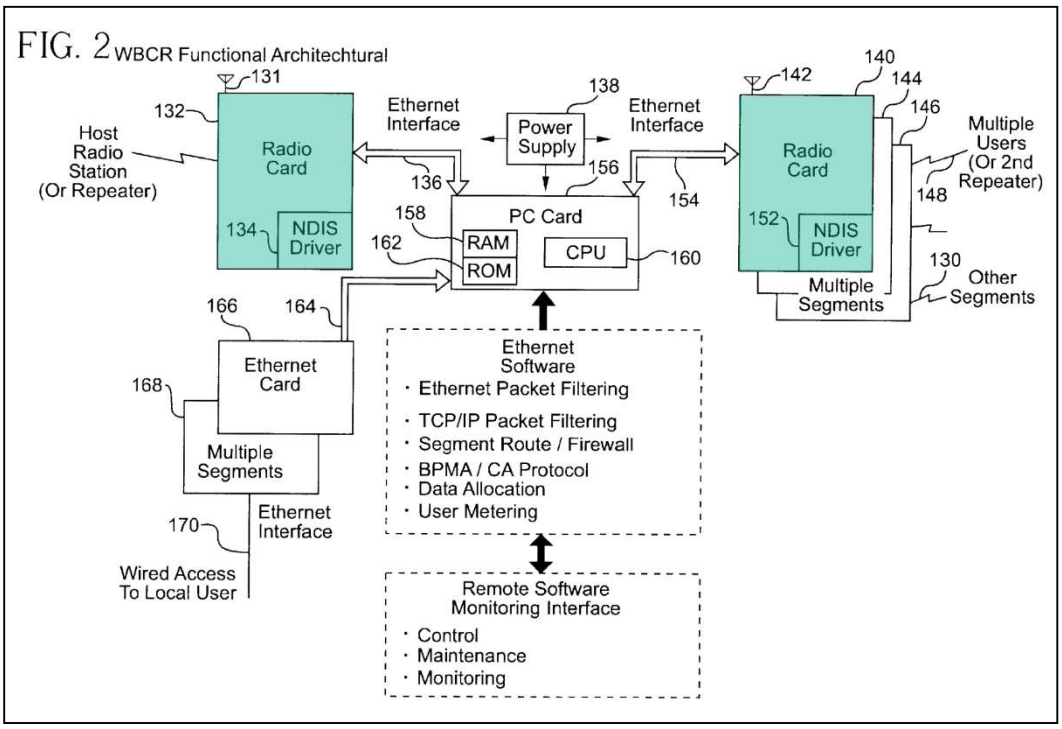
Ganz's invention "relates generally to a radio communications repeater, and more particularly relates to a radio communications repeater system for high-speed data communication which enables multiple users to access a common geographically distributed radio channel. (EX1005, 1:7-12). Ganz further explains that "[t]he radio/data link element circuits" within its wireless burstable communications repeater (WBCR) "can incorporate an IEEE 802.11 specification, the disclosure of which is incorporated herein by reference, which calls for two different physical layer implementations: frequency hopping spread spectrum (FHSS) and direct sequence spread spectrum (DSSS)." (EX1005, 7:12-16.) (EX1002, ¶93.)

Larrick discloses "[a] waveform-adaptive ultra-wideband (UWB) transmitter and noise-tracking UWB receiver for use in communications, object detection and radar applications." Larrick also claims "[a] communication system utilizing an ultra-wideband (UWB) transmitter" (EX1007, 24:52-53) and "[a] method of communicating data by transmitting and detecting an ultra wideband UWB pulse." (*id.*, 27:17-18). (EX1002, ¶94.)

Thus, as further discussed in the below limitations, Ganz/Larrick discloses a broadband wireless repeater or relay. (EX1002, ¶95.)

b) 1[a]: at least one receiver or transceiver for signal or data reception from one or more devices;

Ganz discloses a wireless burstable communications repeater (WBCR) that includes a first transceiver circuit 132 and a second transceiver circuit 140. (EX1005, 3:64-4:21.) A block diagram of a WBCR functional architecture is illustrated in FIG. 2 including the first and second transceiver circuits. (EX1005, 3:64-4:21.) (EX1002, ¶96.)



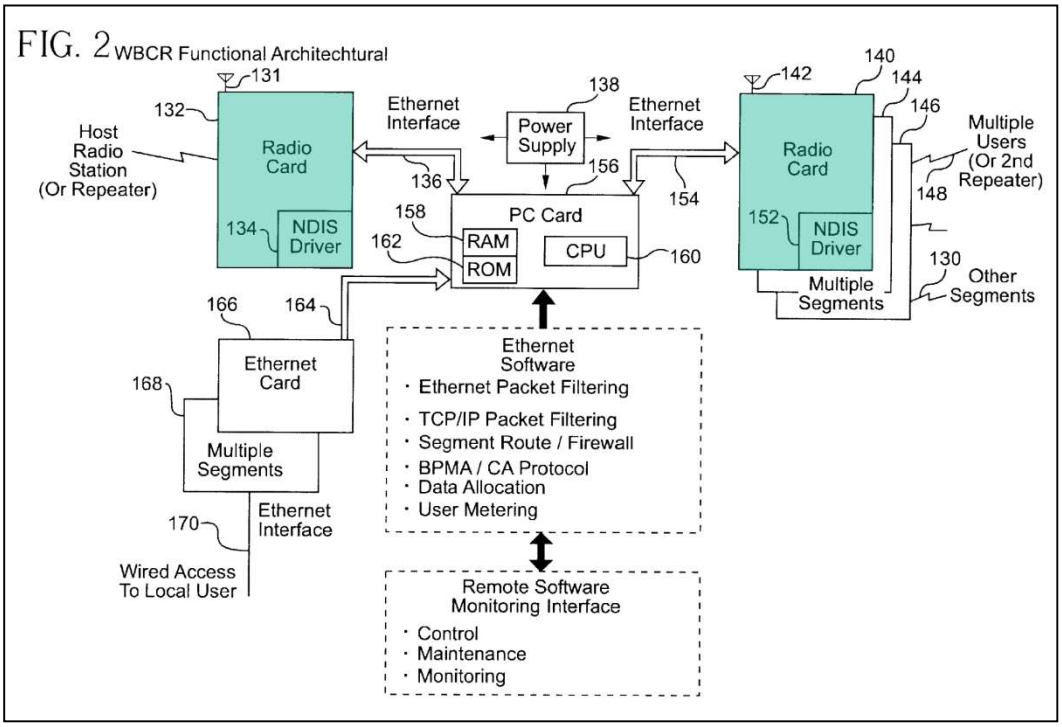
Ganz describes that "[t]he WBCR functions, such that the data packets coming from the user side, are ***received*** by the second radio transceiver circuit 140." (EX1005, 4:22-24.) Further, the second radio transceiver circuit 140 "provides multiple radio frequency access to remotely distributed users and/or other WBCRs." (EX1005, 4:9:12.) (EX1002, ¶97.)

Additionally, Ganz explains that the first radio transceiver circuit 132 "provides the radio frequency link to a host radio station and, optionally, to one or more repeaters." (EX1005, 4:8-12.) During a full data stream transfer, data packets can be "***receiv[ed]***…from the host radio station" by the first radio transceiver circuit 132 before being "transmitted to the user" via the second radio transceiver circuit 140. (EX1005, 4:30-35.) (EX1002, ¶98.)

Thus, Ganz discloses at least one transceiver for signal or data reception from one or more devices. (EX1002, ¶99.)

c) 1[b]: at least one transmitter or transceiver for signal or data transmission to one or more devices,

As described above, Ganz discloses a wireless burstable communications repeater (WBCR) containing at least two transceivers shown in FIG. 2. (EX1005, 3:64-4:21.) (EX1002, ¶100.)



Ganz explains that the first radio transceiver circuit 132 "provides the radio frequency link to a host radio station and, optionally, to one or more repeaters." (EX1005, 4:8-12.) During a full data stream transfer, data packets can be "receiv[ed]…from the host radio station" by the first radio transceiver circuit 132

before being "***transmitted*** to the user" via the second radio transceiver circuit 140. (EX1005, 4:30-35.) (EX1002, ¶101.)

Additionally, Ganz describes that "[t]he WBCR functions, such that the data packets coming from the user side, are received by the second radio transceiver circuit 140… before being ***retransmitted*** by the radio transceiver circuit" to the host radio station. (EX1005, 4:22-26.) Further, the second radio transceiver circuit 140 "provides multiple radio frequency access to remotely distributed users and/or other WBCRs." (EX1005, 4:9:12.) (EX1002, ¶102.)

Thus, Ganz discloses at least one transceiver for signal or data transmission from one or more devices. (EX1002, ¶103.)

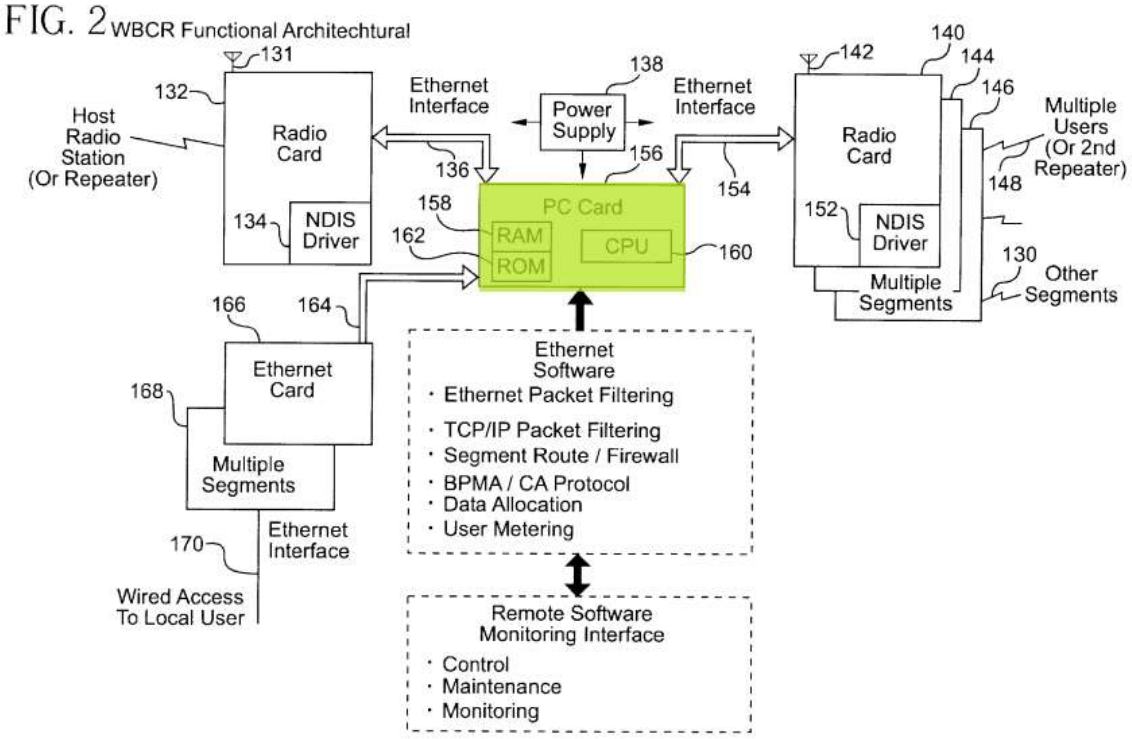
d) 1[c]: wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and

According to Ganz, "[t]he radio transceiver circuit 132, provides the radio frequency link to a host radio station and, optionally, to one or more repeaters. The second radio transceiver circuit 140, provides multiple radio frequency access to remotely distributed users and/or other WBCRs." (EX1005, 4:8-21.) Thus Ganz discloses multiple transceivers that may perform both signal or data transmission and reception, and thereby discloses wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be different or the same. (EX1002, ¶104.)

e) 1[d]: a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,

Ganz discloses a wireless burstable communications repeater (WBCR) containing a "computer circuit 156" that "***performs the controlling functions*** within the WBCR and includes the processor 160 (e.g., 486 CPU or equivalent), the RAM circuit 158 and the ROM circuit 162." (EX1005, 4:15-21.) (EX1002, ¶105.)

FIG. 2 WBCR Functional Architechtural

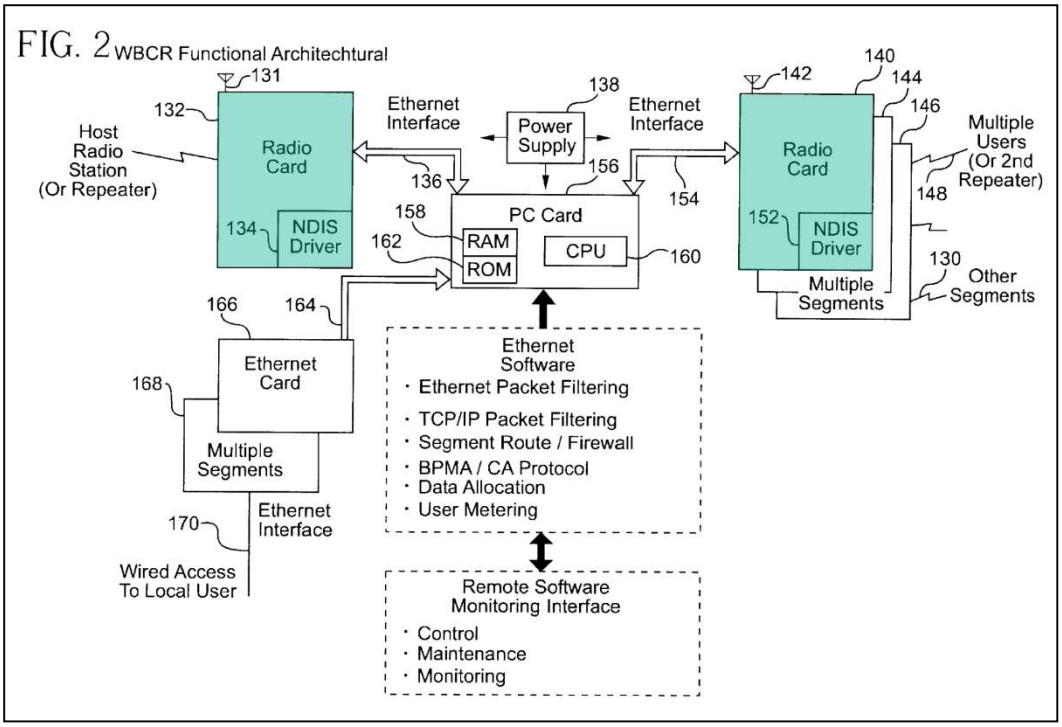


As is evident in FIG. 2 above, the computer circuit communicates with each transceiver circuit 132 and 140. (EX1002, ¶106.)

f) 1[e]: wherein at least one of said receiver or

transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,

Ganz discloses a wireless burstable communications repeater (WBCR). A block diagram of a WBCR functional architecture is illustrated in FIG. 2 including a radio transceiver circuit 132 and a second radio transceiver circuit 140. (EX1005, 3:64-4:21.) (EX1002, ¶107.)



Ganz does not expressly disclose that the transmitter is configured for transmitting and receiving at an instantaneous or overall occupied bandwidth of 100 MHz. However, Larrick discloses a transmitter using the claimed bandwidth and as

discussed above, a POSITA would have been motivated to combine Ganz and Larrick. (EX1002, ¶108.)

Larrick "relates to the field of ultra-wideband communication systems. More particularly, [Larrick] relates to the controlled transmission and reception of ultra-wideband electromagnetic pulses." (Ex. 1007, 1:21-24) Larrick discloses "UWB transmitters which generate UWB signals having controllable spectral characteristics." (*Id.*, 9:21-23) "[U]nlike direct high-power impulse excitation of an antenna as in conventional UWB transmitters, low-level impulse excitation of bandpass filter 102 provides complete control over all aspects of the spectral emissions of the UWB transmitter. This is because the spectral emissions are determined exactly by the characteristics of bandpass filter 102, for instance by the center frequency, bandwidth, out of band rejection and skirt responses." (*Id.*, 11:26-35.) (EX1002, ¶109.)

In one described embodiment and as shown in FIG. 12A, "[a]n UWB transmitter using a low-level impulse generator and microwave bandpass filter was constructed which generated an L-band UWB signal at a center frequency of 1.5 GHz, ***with a 3 dB bandwidth of 400 MHz***." (EX1007, 10:61-64.) (EX1002, ¶110.)

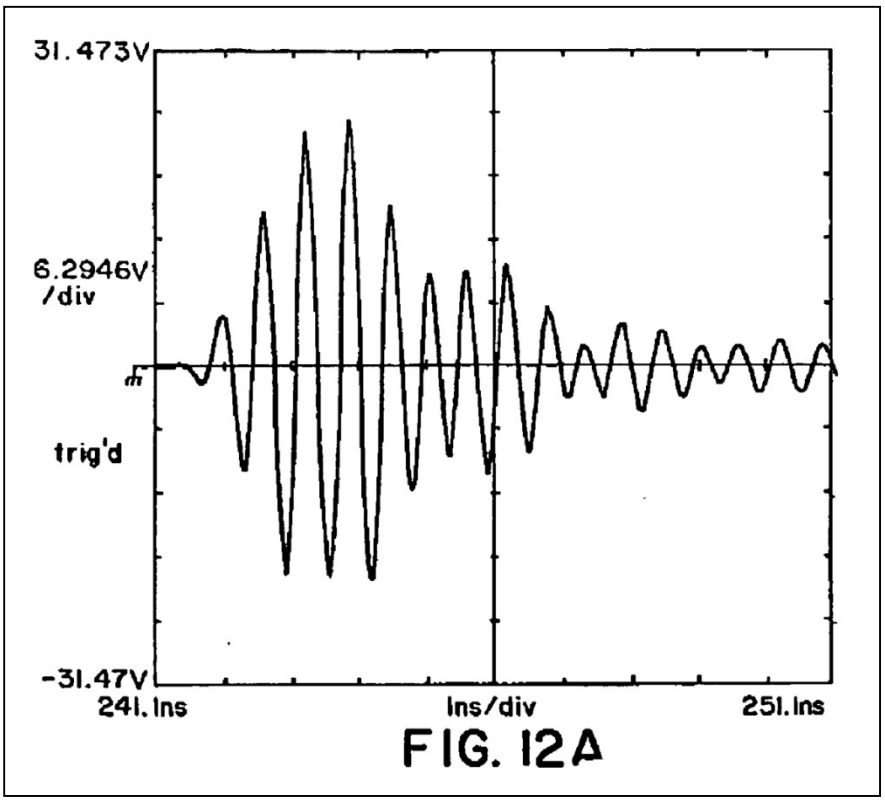


FIG. 12A

FIG. 12B shows the frequency spectrum of the UWB signal shown in FIG. 12A. "The particular filters used were L-band bandpass filters, with a center frequency of 1.5 GHz, ***a 1 dB bandwidth of 400 MHz, a 3 dB bandwidth of 500 MHz***, rejection at 1 GHz of greater than 30 dB down." (*Id.*, 10:65-11:4.) (EX1002, ¶111.)

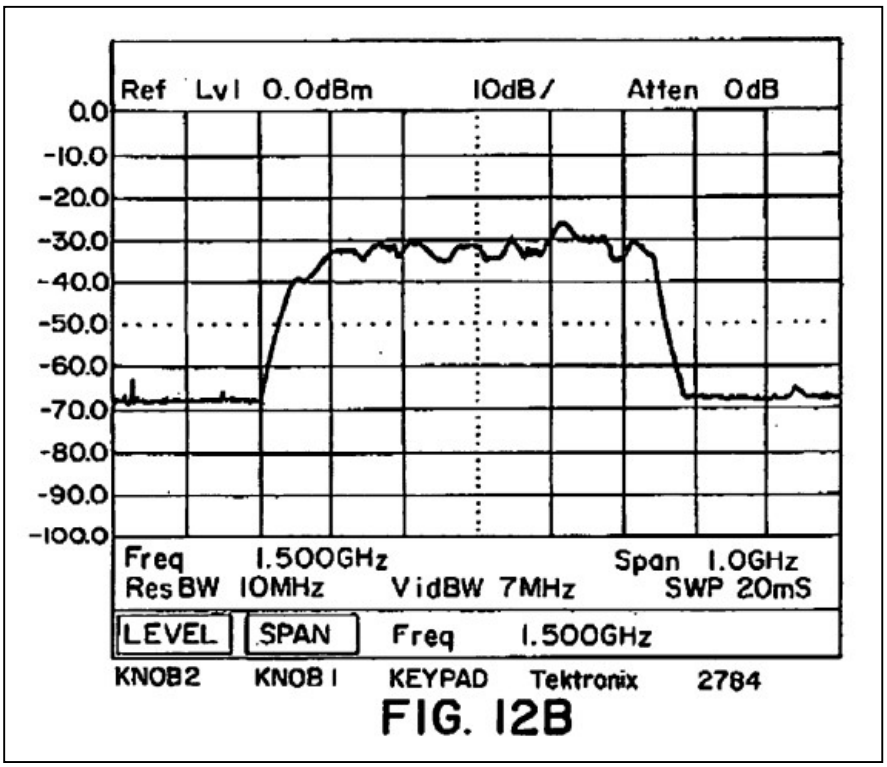


FIG. 12B

FIG. 16 "a photograph of a circuit board of a transceiver utilizing the present invention" (*id.*; 9:7-8) "shows the UWB receiver imbedded in a full duplex, voice/data ultra wideband transceiver. The RF section of this particular unit (lower left hand side) is wideband from a few MHz to beyond 4 GHz. Tunnel diodes with adequate response characteristics to 26 GHz and beyond are currently available, and thus **the UWB receiver can readily accommodate a wide variety of center frequencies between a few MHz upwards toward 26 GHz**." (*Id.*; 21:54-61) (EX1002, ¶112.)

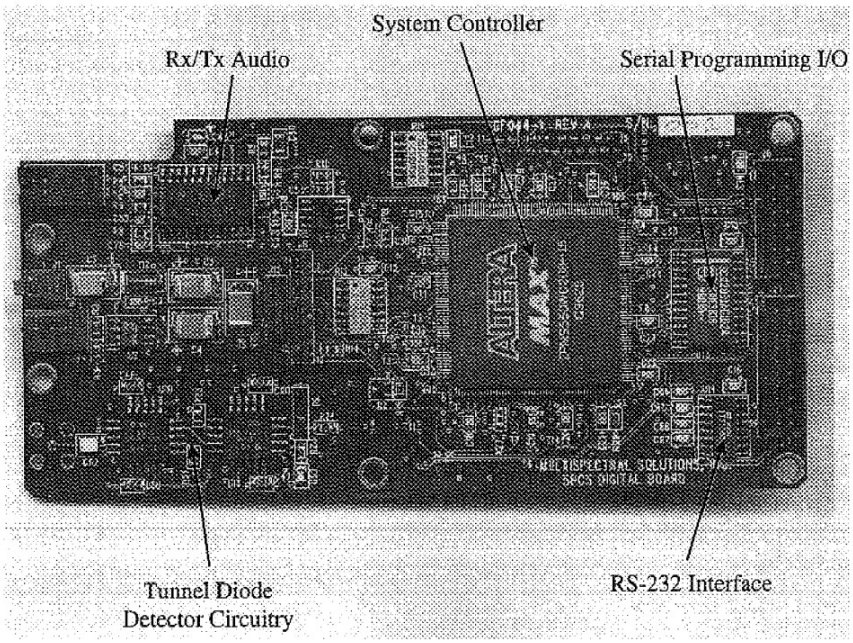


FIG. 16

A POSITA would have understood that the ultra-wideband transmitter on the same circuit board as the ultra-wideband receiver would be designed or calibrated to transmit transmissions to the ultra-wideband receiver of the transceiver. Larrick describes and shows the calibration of the receiver. (EX1007, FIG. 15 and 19:35-21:12.) In the object detection applications described in Larrick, it would be advantageous if not required that the transmitter have the same frequency bandwidth as the receiver. Larrick discloses a transmitter with the claimed data rates and as discussed above, a POSITA would have been motivated to combine Ganz and Larrick. In particular, Larrick discloses that its ultra-wideband transmitter is capable of "data rates in the ***hundreds of megabits per second*** or more, frequency agility on

a pulse-to-pulse basis allowing frequency hopping if desired, and extensibility from below HF to millimeter wave frequencies." (EX1007, Abstract.) (EX1002, ¶113.)

g) 1[f]: wherein said broadband wireless repeater or relay is connected or connectable to one or more network backbones for connecting said one or more wireless networks with said one or more network backbones,

Ganz teaches that its repeater device is connects the wireless network to a network backbone. In particular, Ganz describes that it maximizes the bandwidth of network traffic of "***backbone connections***," such as by "throttling open network connections down to the minimum guaranteed bandwidth." (EX1005, 10:52-11-4.) (EX1002, ¶114.)

Additionally, Ganz describes the software function of "load balancing" to "ensure efficiency of data transfer in the WBCR." (EX1005, 12:12-21.) According to Ganz, "[t]he total bandwidth available to any single WBCR is limited only by the number of connections it has to other segments of the network. Since each individual link has an available bandwidth that is typically smaller than ***the backbone connectivity for the network as a whole,*** a load balancing mechanism is used for optimizing the total system throughput. This allows the creation of bandwidth on demand, by routing excess traffic through links that would otherwise be underutilized." (EX1005, 12:12-21.) Moreover, Figure 1 depicts that its repeaters connect "Local" or "Lan" networks with "Landline[s]" or a "Link to the Internet."

(EX1005, Fig. 1; *see also id.*, 3:40-42 ("land line link 4 (*i.e.*, Internet or other private distribution data sources"). A POSITA would understand that a landline or Internet connection is provided via a network backbone, especially in view of Ganz's disclosures that the WBCR is connected to a backbone. (EX1002, ¶115.)

h) 1[g]: wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and

Ganz discloses QoS software that "includes bandwidth management functions that provide traffic control of the WBCR, allowing improved network performance while enforcing traffic flows and other network policies." (EX1005, 10:52-54.) These QoS functions include prioritization, which "provides the WBCR with the flexibility to distinguish between time-sensitive traffic and non-time sensitive traffic and to give the former higher priority. A typical prioritization scheme assigns an administratively defined priority to each packet and then forwards the packet to a high, medium, or low priority queue." (EX1005, 11:5-9.) (EX1002, ¶116.)

Additionally, Ganz describes the software function of "load balancing" to "ensure efficiency of data transfer in the WBCR." (EX1005, 12:12-21.) According to Ganz, "[t]he total bandwidth available to any single WBCR is limited only by the number of connections it has to other segments of the network. Since each individual link has an available bandwidth that is typically smaller than the backbone

connectivity for the network as a whole**,** ***a load balancing mechanism is used for optimizing the total system throughput***. This allows the creation of bandwidth on demand**,** ***by routing excess traffic through links that would otherwise be underutilized***." (EX1005, 12:12-21.) (EX1002, ¶117.)

Ganz teaches that its controller permits network information to be modified. For example, Ganz explains that "***[m]onitoring and control*** of the WBCR is achieved by software controlled radio/data communications, between a host radio station and the WBCR… Throughput speeds and data packet drop rates can be measured periodically and ***corrective steps taken to adjust the radio parameters remotely***." (EX1005, 5:47-61.) Further, "[t]he controlling functions implemented as part of the BPMA/CA protocol provide for ***remote dynamic load balancing among the users***, and individually enhancing or reducing the allowable user packet size requests, thereby ensuring efficient network utilization for all users. Basic maintenance functions are performed remotely as well, such as ***adding new users and user ID's, and updating user priority codes***." (EX1005, 5:47-61.) (EX1002, ¶118.)

To the extent PO argues that this limitation is not disclosed by Ganz, it is likewise expressly disclosed by Roese, and a POSITA would have been motivated to modify Ganz' system to include Roese's teachings for the reasons discussed above. Roese discloses a "network entry device," such as a wireless repeater, using

network information in support of position location capabilities. (EX1012, 31:36-42 ("Network entry devices 114 can include, for example, switches, routers, hubs, bridges, repeaters, wireless access points ….").) Specifically, Roese describes that a network entry device can "determine its physical location" by "receiv[ing] location information from each of its neighboring devices." (EX1012, 36:62-64; *see also id.*, 8:33-40 ("System 100 can employ a first System 100 can employ a first group of mechanisms/techniques for identifying the location of a device (e.g., 104, 114) that communicates via radio frequencies. For example, system 100 triangulates the location of a device using one or more wireless access points, such as 120a-b, associated with network entry devices 114, such as 114a and 114b, respectively, as shown in FIG. 1.") Such location information can then be ***used by a network***, such as to determine the position location of a user device. (EX1012, 9:47-50 ("System 100 also can use signal amplitude differential from the network entry devices 114a and 114b to determine relative location of user device 104b with respect to an antenna on network device 114a or 114b."). (EX1002, ¶119.)

i) **1[h]: wherein said controller is configured or configurable to perform or for performing at least one of: a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks,**

or noise sources.

"a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources"

Ganz discloses that its WBCR includes a "firewall circuit 222," which can "read IP addresses and protect the gates and authorize access by users," and also "be programmed to pass through what ever services are required by the user without interference." (EX1005, 10:33-42.) As was known with firewalls, they "can also block traffic from the Internet to the internal network, but permit internal users to communicate with the Internet." (*Id.*; *see also* 13:2-4 ("The firewall 268, drops packets that don't meet its rules for valid traffic.").) A POSITA would have undersood that, in other words, a firewall processes received data packets by inspecting their origin (*e.g.* Internet vs. internal) or the targeted service and blocking or allowing the data packet. (EX1002, ¶120.)

Ganz also discloses that the WBCR performs "IP filtering," which "allows for certain data packets to be blocked, ***processed*** according to QoS policies and used to assess and sort according to traffic load on each WBCR radio segment." (*Id.*, 11:45-48.) IP filtering also "automatically drops (destroys) incorrectly formed packets or those which the system has been programmed to reject." (*Id.*, 12:70-13:2.) (EX1002, ¶121.)

Thus, a POSITA would understand that the controller in Ganz's WBCR is

configurable to "ignore or filter out at least some signal or data transmissions," from undesired transmitters, users, networks, data sources, or noise sources. (EX1002, ¶122.)

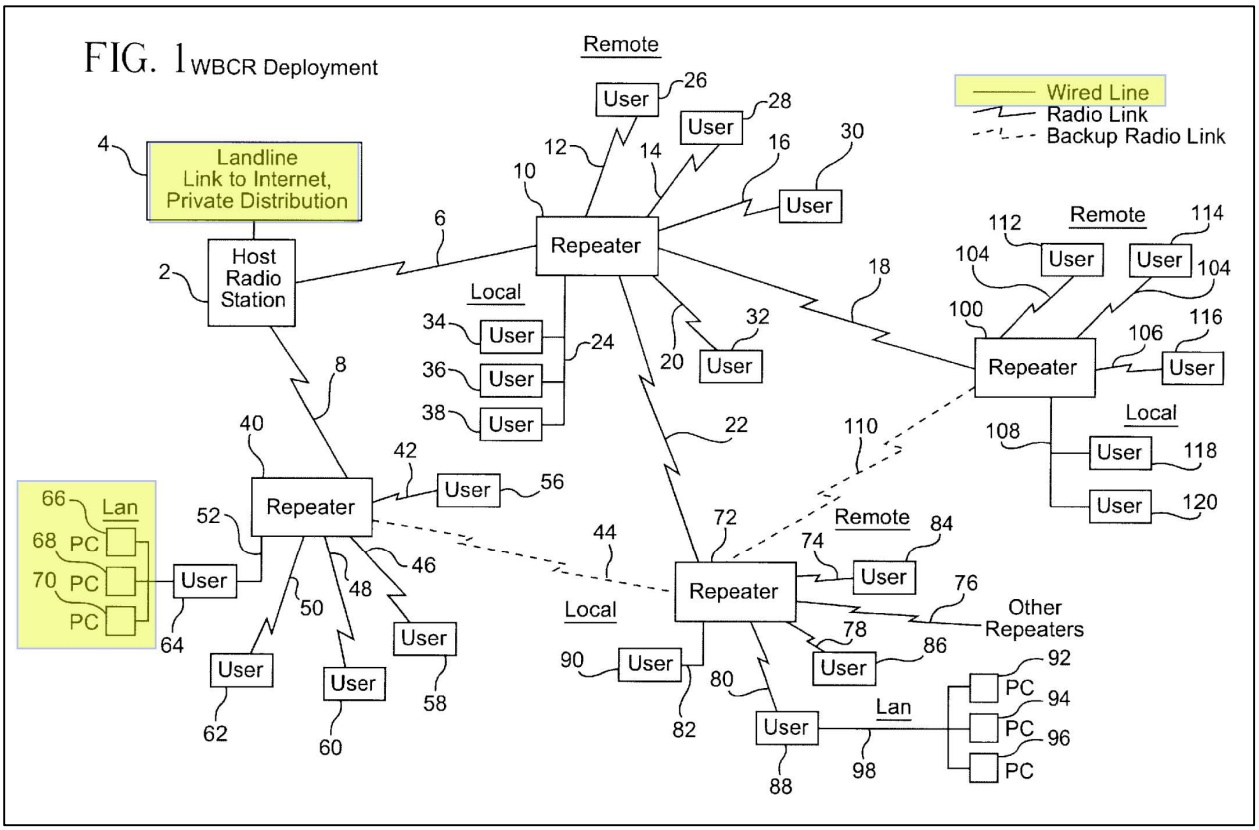
> ***"b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources"***

As discussed above, Ganz discloses ignoring or filtering out at least some signal or data transmissions of undesired transmitters, users, networks, data sources, or noise sources. Given that Ganz explains that its WBCR is configured to "***communicate with at least one end user*** by either a direct electrical connection or a wireless connection" (EX1005, 2:46-50.), it would have been obvious to a POSITA that Ganz's WBCR could also perform the function of "instruct[ing] one or more devices or networks to ignore or disregard at least some signal or data transmissions." Ganz already discloses that its WBCR has information on "undesired" signal or data transmissions, as a well as means of communicating that information. Thus, a POSITA would have known that modifying Ganz's WBCR to communicate information on "undesired" signal or data transmissions, thereby "instructing" end user devices to ignore or disregard those signal or data transmissions, could be done without technical challenge and with a reasonable expectation of success. (EX1002, ¶123.)

2. Claim 2

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said one or more network backbones to which said controller is connected or connectable is a wired backbone.

Ganz' WBCR deployment scheme, illustrated in FIG. 1, "includes: a host radio station 2, a land line link 4, a WBCR 10, a remote user 26, a physical data line 24, and a local user 34." "The host radio station 2, provides data communications from the land line link 4 (*i.e.*, Internet or other private distribution data sources) to users 26 remotely located from the host radio station 2, by a network of WBCRs 10, 100, 72, 40. (EX1002, ¶124.)



The WBCR in Ganz also "reads" each data packet in transit and directs it to the appropriate segment (i.e., out to the user radio link side, or to a user local to the repeater site via the Ethernet card). (EX1005, 4:36-39). (EX1002, ¶125.)

3. Claim 3

a) The broadband wireless repeater or relay of claim 2, wherein said wired backbone is selected from a group consisting of T1, T3, DSL, cable, cable modem, fiber, optical cable, copper lines, coax, phone, ethernet, and internet.

See claim 2 (EX1002, ¶126.)

4. Claim 4

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said one or more network backbones to which said controller is connected or connectable is a wireless backbone.

Ganz describes that the WBCR as shown in FIG. 3 preferably includes two antennas, a radio/data link element circuit 190, a second radio/data link element circuit 198, a medium access control (MAC) circuit, a packet exchange bus, and a network control module circuit. (EX1005, 6:4-13) "The radio/data link element circuit 190 includes a radio frequency transmitter circuit and a radio frequency receiver circuit. These circuits provide the radio frequency communication between a host radio station and other repeaters." (*Id.*, 6:21-24.) "**The radio/data link element circuits can incorporate an IEEE 802.11 specification, the disclosure of which is incorporated herein by reference**, which calls for two different physical

layer implementations: frequency hopping spread spectrum (FHSS) and direct sequence spread spectrum (DSSS).” (*Id.*, 7:12-16.) (EX1002, ¶127.)

5. Claim 5

a) The broadband wireless repeater or relay of claim 4, wherein said wireless backbone is selected from a group consisting of last mile wireless service, mesh network, LMDS, MMDS, WiMax, 802.16, 802.20, 802.11a/b/g, 802.15.3.a, RF, and baseband.

See claim 4. To the extent Ganz does not expressly disclose IEEE 802.11a/b/g, these merely add additional clauses to the IEEE 802.11 standard and a POSITA would have readily incorporated these additions to the IEEE 802.11 standard with a reasonable expectation of success. (EX1002, ¶128.)

6. Claim 6

a) The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or configurable to perform a).

*See*limitation 1[h]. (EX1002, ¶129.)

7. Claim 7

a) The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or configurable to perform b).

See limitation 1[h]. (EX1002, ¶130.)

8. Claim 8

a) The broadband wireless repeater or relay of claim 1, wherein said controller is configured to or

configurable to perform network provisioning or monitoring.

Ganz describes software controlled radio/data communications that perform *"**[m]onitoring and control of the WBCR.**"* (EX1005, 5:47-48.) As such, "[t]hroughput speeds and data packet drop rates can be measured periodically and corrective steps taken to adjust the radio parameters remotely." (EX1005, 5:51-54.) "The controlling functions implemented as part of the BPMA/CA protocol provide for remote dynamic load balancing among the users, and individually enhancing or reducing the allowable user packet size requests, thereby ensuring efficient network utilization for all users." (EX1005, 5:54-58.) Additionally, "[b]asic maintenance functions are performed remotely as well, such as adding new users and user ID's, and updating user priority codes." (EX1005, 5:58-61). Thus, a POSITA would understand that Ganz discloses that its controller performs network provisioning or monitoring. (EX1002, ¶131.)

9. Claim 9

a) 9[pre]: The broadband wireless repeater or relay of claim 8, wherein the network provisioning or monitoring includes one or more of:

b) 9[a]: i) bandwidth or delay provisioning of repeated or relayed transmissions,

c) 9[b]: ii) application prioritization,

d) 9[c]: iii) prioritizing, delaying or altering of data transmissions, traffic, or bandwidth, and

e) 9[d]: iv) monitoring or measuring traffic from one or more devices, users or networks.

For example, Ganz discloses QoS software that "includes bandwidth management functions that provide traffic control of the WBCR, allowing improved network performance while enforcing traffic flows and other network policies." (EX1005, 10:52-54.) These QoS functions include prioritization, which "provides the WBCR with the flexibility to distinguish between time-sensitive traffic and non-time sensitive traffic and to give the former higher priority. A typical prioritization scheme assigns an administratively defined priority to each packet and then forwards the packet to a high, medium, or low priority queue." (EX1005, 11:5-9.) (EX1002, ¶132.)

Additionally, Ganz describes the software function of "load balancing" to "ensure efficiency of data transfer in the WBCR." (EX1005, 12:12-21.) According to Ganz, "[t]he total bandwidth available to any single WBCR is limited only by the number of connections it has to other segments of the network. Since each individual link has an available bandwidth that is typically smaller than the backbone connectivity for the network as a whole**,** ***a load balancing mechanism is used for optimizing the total system throughput***. This allows the creation of bandwidth on demand**,** ***by routing excess traffic through links that would otherwise be underutilized***." (EX1005, 12:12-21.) (EX1002, ¶133.)

For example, Ganz discloses QoS software that "includes bandwidth management functions that provide traffic control of the WBCR, allowing improved network performance while enforcing traffic flows and other network policies." (EX1005, 10:52-54.) These QoS functions include prioritization, which "provides the WBCR with the flexibility to distinguish between time-sensitive traffic and non-time sensitive traffic and to give the former higher priority. A typical prioritization scheme assigns an administratively defined priority to each packet and then forwards the packet to a high, medium, or low priority queue." (EX1005, 11:5-9.) (EX1002, ¶134.)

Additionally, Ganz describes the software function of "load balancing" to "ensure efficiency of data transfer in the WBCR." (EX1005, 12:12-21.) According to Ganz, "[t]he total bandwidth available to any single WBCR is limited only by the number of connections it has to other segments of the network. Since each individual link has an available bandwidth that is typically smaller than the backbone connectivity for the network as a whole***, a load balancing mechanism is used for optimizing the total system throughput***. This allows the creation of bandwidth on demand***, by routing excess traffic through links that would otherwise be underutilized***." (EX1005, 12:12-21.) (EX1002, ¶135.)

10. Claim 10

a) 10[pre]: The broadband wireless repeater or relay of

claim 1, wherein said controller is configured or configurable to perform or for performing all of:

See limitations 1[pre] and 1[h]. (EX1002, ¶136.)

b) 10[a]: a);

See limitation 1[h]. (EX1002, ¶137.)

c) 10[b]: b); and

See limitation 1[h]. (EX1002, ¶138.)

d) 10[c]: c) network provisioning or monitoring.

See claim 8. (EX1002, ¶139.)

11. Claim 11

a) The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in half duplex.

Ganz describes that "the present invention [] provide[s] a radio communications repeater which is capable of full data rate transfers in ***half-duplex systems***." (EX1005, 2:17-19.) (EX1002, ¶140.)

12. Claim 12

a) The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in full duplex.

Ganz describes a communication system comprising "a plurality of wireless

communication repeaters wherein ***each repeater is adapted for two way wireless full-duplex communication*** with at least one of the host radio station and another repeater within a line-of-sight of the repeater to enable communication between the host radio station and repeaters beyond a line-of-sight of the host radio station." (EX1005, 13:15-20; *see also*, *id.*, 14:33-38 and 15:41-58.) (EX1002, ¶141.)

13. Claim 13

a) The broadband wireless repeater or relay of claim 1, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in simplex.

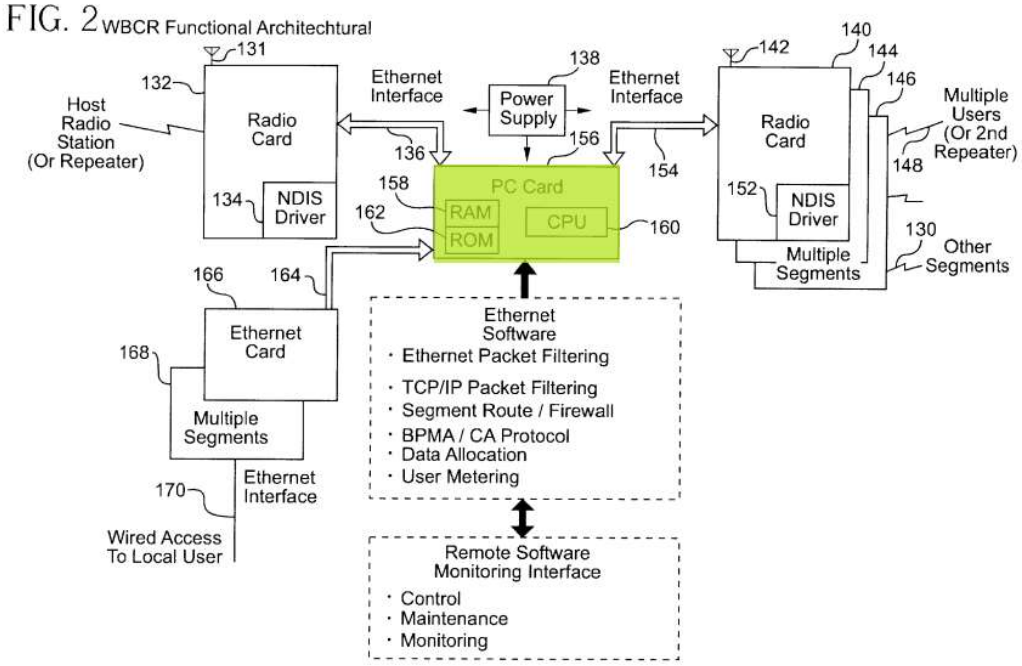
Ganz discloses a transceiver operating in both half-duplex and full-duplex. *See* claims 11, 12 above. A POSITA would understand that a system containing transceivers that operate in half-duplex and full-duplex would be easily modifiable to operate in simplex, as it would require transmission of information in only a single direction rather than in two directions. (EX1002, ¶142.)

14. Claim 14

a) The broadband wireless repeater or relay of claim 1, wherein said signals or data received by said receiver or transceiver for receiving signals or data, or signals or data transmitted by said transmitter or transceiver for transmitting signals or data, or signals or data controlled by said controller include modified, stored, or delayed signals or data.

Ganz discloses a "computer circuit 156" that contains the "processor 160," the

"RAM circuit 158," and the "ROM circuit 162." When information is received by the WBCR, "the data packets coming from the user side, are received by the second radio transceiver circuit 140 and then ***temporarily buffered in the RAM circuit 158*** before being retransmitted by the radio transceiver circuit 4 to the host radio station." (EX1005, 4:22-26, FIG. 2.) (EX1002, ¶143.)



Ganz further discloses a "cache" within its software modules, which keeps "popular" data locally, thereby "reduc[ing] the overall requirements for remote backbone bandwidth." (EX1005, 11:52-64.) Further, "[t]he WBCR can communicate cache information with its neighbors via the RFC 2186 internet cache protocol, thus a distributed object cache can flow throughout the local network instead of being limited to a single node." *Id.* Thus, a POSITA would understand

that Ganz discloses controlling modified, stored, or delayed signals or data. (EX1002, ¶144.)

15. Claim 15

a) The broadband wireless repeater or relay of claim 1, wherein said controller is configured to cause said at least one transmitter or transceiver for transmitting signals or data to transmit modified received data or transmissions to one or more devices at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more.

See claim limitation 1[e] and claim 14 above. (EX1002, ¶145)

16. Claim 16

a) 16: The broadband wireless repeater or relay of claim 1, wherein said controller is configured to identify one or more devices in said one or more wireless networks.

Ganz describes, as part of its capacity management processes, that "[t]he WBCR may also be segregated into multiple tiers or layers when a segment on a user end approaches capacity." (EX1005, 5:33-46.) This is accomplished with the use of "additional radio transceiver circuits on the user side of the WBCR, ***each with its own unique IP address, Ethernet and radio ID code***." *Id.* Ganz further describes that basic maintenance functions for ensuring efficient network utilization can be performed remotely, such as "adding new users and ***user ID's***, and updating user priority codes." (EX1005, 5:58-60.) Thus, Ganz describes that its WBCR is able to

identify one or more devices in the network. (EX1002, ¶146.)

17. Claim 20

a) The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured to be integrated with or in communication with a vehicle, train, aircraft, or other moving platform.

Larrick describes that "[s]everal laboratory models using [early versions of UWB impulse transmitters] were constructed for radar applications which included ship docking, pre-collision sensing for automobiles, liquid level sensing, and intrusion detection. Although these techniques proved to be reliable, the power efficiency, PRF limitations, size and complicated antenna assemblies limited performance and reproducibility." (EX1007, 2:5-11.) It was therefore an object of Larrick to "provide an UWB transmitter system that obviates pulse repetition frequency (PRF) limitations of conventional systems, thus allowing extremely high data rates on the order of hundreds of megabits per second." (*Id.*, 7:21-25.) (EX1002, ¶147.)

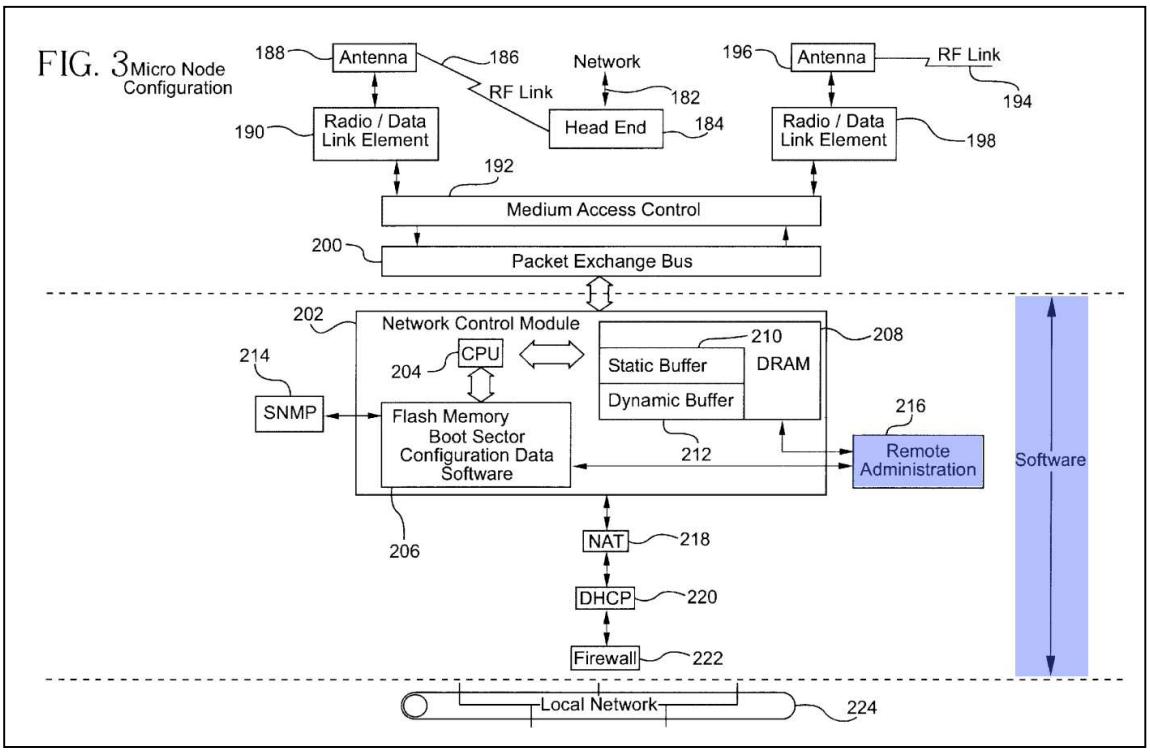
18. Claim 24:

a) The broadband wireless repeater or relay of claim 1, wherein said repeater or relay is configured to be integrated with or in communication with a device selected from the group consisting of a television, a telephone, a cellphone, a computer, a camera, a video system, a monitor, a power plug, a wall outlet, a watch, a cable modem, a vehicle or other moving

platform, a game console, and an ultrawideband transceiver or device.

Ganz describes that "***[t]he management software 230, provides for remote administration***. Remote administration of the WBCR is possible by a high level encryption scheme and secure ports. Security keys are generated on a regular time period (e.g. every 60 minutes) to ensure that no key is active long enough to be broken. Initial keys are exchanged by an encrypted password, so that no passwords appear in clear-text on any network." (EX1005, 11:65-12:5). (EX1002, ¶148.)

A POSITA would understand that "management software" which "provides for remote administration" would include an interface accessible from a remote computer. A POSITA would understand that in order to provide remote administration, the management software would provide an interface for the remote administrator to perform the administrative tasks. Such an interface would be accessible from a remote computer. (EX1002, ¶149.)



19. Claim 25:

a) The broadband wireless repeater or relay of claim 1, wherein one or more of said receiver or transceiver for signal or data reception, said transmitter or transceiver for signal or data transmission, and said controller is embedded in one or more integrated circuit chips.

Larrick's FIG. 16 "a photograph of a circuit board of a transceiver utilizing the present invention" (*id.*; 9:7-8) "shows the UWB receiver imbedded in a full duplex, voice/data ultra wideband transceiver. The RF section of this particular unit (lower left hand side) is wideband from a few MHz to beyond 4 GHz. Tunnel diodes with adequate response characteristics to 26 GHz and beyond are currently available, and thus the UWB receiver can readily accommodate a wide variety of center

frequencies between a few MHz upwards toward 26 GHz." (*Id.*; 21:54-61.) (EX1002, ¶150.)

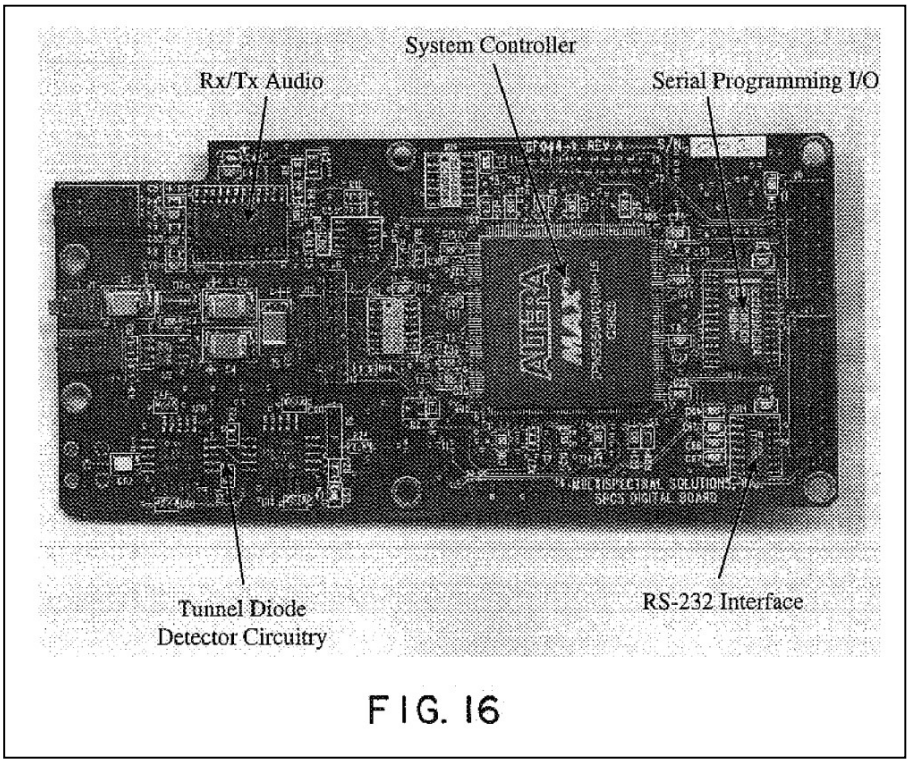


FIG. 16

Thus, Larrick discloses that its controller is embedded in an integrated circuit chip. (EX1002, ¶151.)

20. Claim 26:

a) The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured or configurable for monitoring or measuring traffic passed through, received by or transmitted by said broadband wireless repeater or relay.

Ganz describes software controlled radio/data communications that perform *"**[m]onitoring and control of the WBCR.**"* (EX1005, 5:47-48.) As such,

"[t]hroughput speeds and data packet drop rates can be measured periodically and corrective steps taken to adjust the radio parameters remotely." (EX1005, 5:51-54.) "The controlling functions implemented as part of the BPMA/CA protocol provide for remote dynamic load balancing among the users, and individually enhancing or reducing the allowable user packet size requests, thereby ensuring efficient network utilization for all users." (EX1005, 5:54-58.) Additionally, "[b]asic maintenance functions are performed remotely as well, such as adding new users and user ID's, and updating user priority codes." (EX1005, 5:58-61). Thus, a POSITA would understand that Ganz discloses that its WBCR is configurable for monitoring or measuring traffic that passes through it. (EX1002, ¶152.)

21. Claim 27

a) The broadband wireless repeater or relay of claim 1, wherein said broadband wireless repeater or relay is configured or configurable to modify at least some received signals or data from one or more devices, users or networks and transmit modified or delayed signals or data to at least one device, network or user via wireless communication.

Ganz discloses sending modified or delayed signals or data as discussed above for Claim 14. (EX1002, ¶153.)

Additionally, Ganz discloses that these signals can be sent wirelessly. For example, Ganz is directed to a "wireless high speed data communication system," in which a host radio station transmits data to a wireless communication repeater,

which communicates with at least one end user. "The host radio station transmits and receives data to and from at least one wireless communication repeater within line of sight of the host radio station," thus communicating wirelessly, and "[t]he repeater is configured to communicate with at least one end user by ***either a direct electrical connection or a wireless connection***." (EX1005, 2:46-50.) Thus, Ganz discloses sending modified or delayed signals or data via wireless communication. (EX1002, ¶154.)

22. Claim 28

a) The broadband wireless repeater or relay of claim 1, wherein said controller and one or more of said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission are integrated.

See claim 25. (EX1002, ¶155.)

VIII. GROUND 2: Ganz, Larrick, and Roese in Combination with Perlman Renders Claims 18-19 and 21-22 Obvious

A. Overview and Motivation to Combine

Perlman teaches various conventional repeater techniques that were well-known, including using repeaters to increase the coverage distance of the network, to obtain coverage in indoor, outdoor, and moving environments, and to make a repeater self-configurable. (EX1002, ¶156.)

A POSITA would have been motivated to incorporate the teachings of

Perlman to improve the Ganz system (along with its combination with Larrick). Both Ganz and Perlman address repeater systems that aimed to address known limitations and problems of wireless technologies at the time. A POSITA would have sought to further improve Ganz by applying the teachings of Perlman because of the utility of increasing the coverage distance of the network, obtaining coverage in indoor, outdoor, and moving environments, and making a repeater self-configurable. Such technologies were conventional and well-known by the time of the '337 patent, and a POSITA would have known and been motivated by their utility. (EX1002, ¶157.)

It was a well-known problem that transmission of high-bandwidth data could be degraded by "structural obstacles," "human traffic," "conflicting devices," as well as "distance between the access point and the mobile terminal or other device." (EX1011, [0006]). The concept of using wireless repeaters to extend coverage throughout a building similarly existed at the time. (EX1011, [0008]). Perlman applies these concepts in its teachings towards a system that utilizes wireless repeaters to solve these problems, increasing the network coverage distance and making it useful in moving, indoor, and outdoor environments. Perlman similarly applies known concepts of making its repeaters self-configurable to provide convenience to the user, negating the need to manually configure each repeater. (EX1002, ¶158.)

A POSITA would have had a reasonable expectation of success combining

Ganz/Larrick with Perlman. Perlman utilizes a combination of known techniques to improve the performance of known repeater technologies. A POSITA would have been well aware of such methods and the conventional ways of implementing such standard technologies. Implementation would have been well-within the skill of an ordinary artisan. (EX1002, ¶159.)

B. Limitation-By-Limitation Analysis

1. Claim 18

a) The broadband wireless repeater or relay of claim 1, wherein said controller is self-configurable.

Perlman discloses a wireless network architecture that is self-configurable. For example, Perlman describes that "[t]he ***self-configuring feature*** of the present invention is also apparent." (EX1011, [0086].) This is done by "a processor in the source access point" that "executes a program or algorithm that determines an optimal set of frequency channels allocated for use by each access point or repeater." (*Id.*) Optimal sets of channels are ones that "do not include over-lapping channels," "avoid[] channels used by other interfering devices in the same locality," and "maximize[] channel re-use." (*Id.*) Further, once a set of the channels has been chosen for use by the access points, "modulated power can be reduced to the minimum needed to achieve maximum bandwidth across each link so as to reduce signal reflections." (*Id.*) Further, Perlman describes that its wireless network "may

also adapt to changes to the network by reconfiguring the channel assignments, such as when new repeaters are added, existing ones removed, or when the network experiences disturbances caused by other interfering devices (e.g., from a neighboring network)." (*Id.*) (EX1002, ¶160.)

Perlman further describes an "adaptation process" similar to the self-configuration process described above, where "all of the different possible combinations of channels may be tried until the network identifies an optimal combination that works to overcome the channel conflict without creating any new conflicts." (EX1011, [0094].) In doing so, "[t]he adaptation process may rely upon an algorithm that does not attempt to change or move channels which have already been established." (*Id.*) Thus, "regardless of the origin of a channel conflict" Perlman's disclosed network "adapts to the disturbance by ***reconfiguring itself*** to optimize performance." (*Id.*) (EX1002, ¶161.)

2. Claim 19

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in a moving platform environment.

Perlman describes that its invention has the ability to "provide connectivity to any user who happens to be within the range of the wireless network." (EX1011,

[0106].) For example, if "a wireless repeater or access point is mounted near a window or on the rooftop of a building," a user with a laptop computer that is within range could connect to the Internet. (*Id.*) Thus, Perlman explains that its invention "provides ever greater mobility by allowing portable computer users to take media content with them." (*Id.*) A POSITA would understand that Perlman thereby allows operation of its network in a moving platform environment, whereby users on mobile or portable devices can connect to the network from different locations. (EX1002, ¶162.)

3. Claim 21

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an indoor environment.

Perlman describes many applications of its network in indoor environments. For example, FIG. 19 is "a floor plan showing two simultaneous wireless networks operating ***in a building*** 84 to increase bandwidth." (EX1011, [0098].) (EX1002, ¶163.)

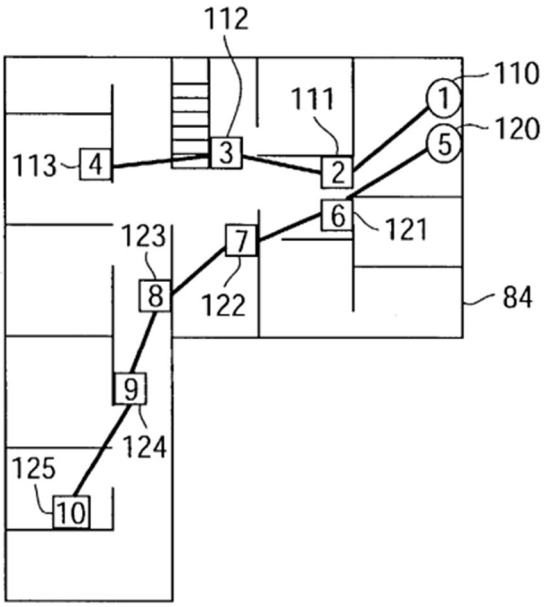


FIG. 19

4. Claim 22

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in an outdoor environment.

Perlman describes that its invention has the ability to "provide connectivity to any user who happens to be within the range of the wireless network." (EX1011, [0106].) For example, if "a wireless repeater or access point is mounted near a window or on the rooftop of a building, ***the outdoor range of the wireless network may be extended to a nearby park or other buildings*** (*e.g.*, a café or coffeehouse). " (*Id.*) A user with a laptop computer that is within range could thereby connect to

the Internet outdoors. (*Id.*) (EX1002, ¶164.)

IX. GROUND 3: Ganz, Larrick, and Roese in Combination with Engels Renders Claims 17, 23, 29-40, 43, and 46-51 Obvious

A. Overview and Motivation to Combine

Engels teaches various conventional antenna technologies that were well-known, including MIMO, beamforming, adaptable, and directional antennas. (EX1002, ¶165.)

A POSITA would have been motivated to incorporate the teachings of Engels to improve the Ganz system (along with its combination with Larrick and Roese) because of the utility of MIMO, beamforming, adaptable, and directional antennas, and cellular networks. Such technologies were conventional and well-known by the time of the ’337 patent, and a POSITA would have known and been motivated by their utility. It was known that MIMO could minimize errors, optimize data speed, and improve bandwidth and capacity by allowing data to travel over multiple signals at the same time. In particular, MIMO would transmit multiple signals along multiple paths, allowing better SNR performance in challenging conditions. (EX1002, ¶166.)

Beamforming is a signal processing technique used in wireless communications (Wi-Fi, 5G, radar, sonar, etc.) that focuses a signal in a specific direction instead of broadcasting it equally in all directions. Beamforming uses

adaptable and steerable antennas. A POSITA would have been motivated to use beamforming as it allows for improved signal strength by directing energy to an intended receiver. This increases range and reduces dead zones, as well as allowing for higher data rates and reduction in interference. Moreover, beamforming allows multiple users to share the same frequency band simultaneously by steering beams in different directions (multi-user MIMO in 5G and Wi-Fi 6/7). Beamforming also increases energy efficiency by concentrating power where it's needed reduces overall wasted transmission energy. (EX1002, ¶167.)

A POSITA would have been motivated to combine Ganz/Larrick/Roese to configure the wireless network device to operate in a cellular network. As discussed above, the '337 patent states "[r]epeaters are well known in the art, and they have been manufactured for decades in the cellular and PCS industries, and more recently, a company in Melbourne Fla., WiDeFi has developed WiFi repeaters for the IEEE 802.11a/b marketplace." (EX1001, 3:27-31.) Engels references "methods of operating cellular wireless systems and the use of repeaters to extend wireless networks," and cites "*The Cellular Radio Handbook*, third edition, N. J. Boucher, Quantum Publishing, 1995, especially, chapters 10, 11 and 12." (EX1008, 7:2-5.) Engels then discloses that its teachings "relate[] to communication between indoor and outdoor environments, especially making use of wireless radio telecommunication networks" which include known cellular technologies such as

"CDMA, FDMA, TDMA …." (EX1008, 7:12-16.) One of ordinary skill in the art will recognize that access points, repeaters, stations, etc. can take various forms in wireless networks. For example, an 802.11 base station may be connected to a wired or wireless wide area network infrastructure such as a cellular modem. One of ordinary skill in the art will similarly recognize that wireless networks may be in accordance with many different protocols such as 802.11, 802.15.3.a, Bluetooth, TDS-CDMA, TDD-W-CDMA, or the like. (EX1002, ¶168.)

A POSITA would have had a reasonable expectation of success combining Ganz/Larrick/Roese with Engels. MIMO, beamforming, and cellular networks were well-known and conventional technologies. A POSITA would have been well aware of such methods and the conventional ways of implementing such standard technologies. Implementation would have been well-within the skill of an ordinary artisan. (EX1002, ¶169.)

B. Limitation-By-Limitation Analysis

1. Claim 17

a) The broadband wireless repeater or relay of claim 1, wherein said repeater or relay employs MIMO or adaptive antenna technology.

Engels teaches that "the usage of ***multiple antenna techniques*** with antenna means (10) may result in a communication with antenna's at multiple outdoor nodes located at different locations." (EX1008, 13:11-13.) These techniques, which are

"particularly useful for providing redundancy in the outdoor connection," include "beamforming, spatial division multiple access (SDMA), ***multiple input multiple output (MIMO) systems***." (EX1008, 13:13-15.) Engels therefore discloses that its network device could be configured for using MIMO antenna technology. (EX1002, ¶170.)

2. Claim 23

a) The broadband wireless repeater or relay of claim 1, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks selected from the group consisting of: a cellular network, an enterprise network, a wireless local area network, or a wireless personal area network.

Engels references "methods of operating cellular wireless systems and the use of repeaters to extend wireless networks," and cites "*The Cellular Radio Handbook*, third edition, N. J. Boucher, Quantum Publishing, 1995, especially, chapters 10, 11 and 12." (EX1008, 7:2-5.) Engels then discloses that its teachings "relate[] to communication between indoor and outdoor environments, especially making use of wireless radio telecommunication networks" which include known cellular technologies such as "CDMA, FDMA, TDMA …." (EX1008, 7:12-16.) (EX1002, ¶171.)

3. Claims 29

a) 29[pre]: A broadband wireless repeater or relay, comprising:

See claim 1[pre]. (EX1002, ¶172.)

b) 29[a]: at least one receiver or transceiver for signal or data reception from one or more devices;

See claim 1[a]. (EX1002, ¶173.)

c) 29[b]: at least one transmitter or transceiver for signal or data transmission to one or more devices,

See claim 1[b]. (EX1002, ¶174.)

d) 29[c]: wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and

See claim 1[c]. (EX1002, ¶175.)

e) 29[d]: a controller that is configured or configurable for operation in one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,

See claim 1[d]. (EX1002, ¶176.)

f) 29[e]: wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,

See claim 1[e]. (EX1002, ¶177.)

g) 29[f]: wherein said repeater or relay employs MIMO or adaptive antenna technology,

See claim 17. (EX1002, ¶178.)

h) 29[g]: wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and

See claim 1[g]. (EX1002, ¶179.)

i) 29[h]: wherein said controller is configured or configurable to perform or for performing at least one of:

j) 29[i]: a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and

k) 29[j]: b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources.

Ganz/Larrick discloses these limitations. *See* claim 1[h]. (EX1002, ¶180.)

4. Claim 30

a) The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform a).

See claim 29[i]. (EX1002, ¶181.)

5. Claim 31

a) The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform b).

See claim 29[j]. (EX1002, ¶182.)

6. Claim 32

a) The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform network provisioning or monitoring.

See claim 8. (EX1002, ¶183.)

7. Claim 33

a) 33[pre]: The broadband wireless repeater or relay of claim 32, wherein the network provisioning or monitoring includes one or more of:

b) 33[a]: i) bandwidth or delay provisioning of repeated or relayed transmissions,

c) 33[b]: ii) application prioritization,

d) 33[c]: iii) prioritizing, delaying or altering of data transmissions, traffic, or bandwidth, and

e) 33[d]: iv) monitoring or measuring traffic from one or more devices, users or networks.

Ganz/Larrick discloses these limitations. *See* claim 9. (EX1002, ¶184.)

8. Claim 34

a) 34[pre]: The broadband wireless repeater or relay of claim 29, wherein said controller is configured or configurable to perform or for performing all of:

b) 34[a]: a);

c) 34[b]: b); and

d) 34[c]: c) network provisioning or monitoring.

Ganz/Larrick discloses these limitations. *See* claim 10. (EX1002, ¶185.)

9. Claim 35

a) The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in half duplex.

See claim 11. (EX1002, ¶186.)

10. Claim 36

a) The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in full duplex.

See claim 12. (EX1002, ¶187.)

11. Claim 37

a) The broadband wireless repeater or relay of claim 29, wherein said at least one receiver or transceiver for receiving signals or data and said at least one transmitter or transceiver for transmitting signals or data operate in simplex.

See claim 13. (EX1002, ¶188.)

12. Claim 38

a) The broadband wireless repeater or relay of claim 29, wherein said signals or data received by said receiver or transceiver for receiving signals or data, or signals or data transmitted by said transmitter or transceiver for transmitting signals or data, or signals or data controlled by said controller include modified, stored, or delayed signals or data.

See claim 14. (EX1002, ¶189.)

13. Claim 39

a) The broadband wireless repeater or relay of claim 29, wherein said controller is configured to cause said at least one transmitter or transceiver for transmitting signals or data to transmit modified received data or transmissions to one or more devices at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more.

See claim 15. (EX1002, ¶190.)

14. Claim 40

a) The broadband wireless repeater or relay of claim 29, wherein said controller is configured to identify one or more devices in said one or more wireless networks.

See claim 16. (EX1002, ¶191.)

15. Claim 43

a) The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured to be integrated with or in communication with a vehicle, train, aircraft, or other moving

platform.

See claim 20. (EX1002, ¶192.)

16. Claim 46

a) The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks selected from the group consisting of: a cellular network, an enterprise network, a wireless local area network, or a wireless personal area network.

See claim 23. (EX1002, ¶193.)

17. Claim 47

a) The broadband wireless repeater or relay of claim 29, wherein said repeater or relay is configured to be integrated with or in communication with a device selected from the group consisting of a television, a telephone, a cellphone, a computer, a camera, a video system, a monitor, a power plug, a wall outlet, a watch, a cable modem, a vehicle or other moving platform, a game console, and an ultrawideband transceiver or device.

See claim 24. (EX1002, ¶194.)

18. Claim 48

a) The broadband wireless repeater or relay of claim 29, wherein one or more of said receiver or transceiver for signal or data reception, said transmitter or transceiver for signal or data transmission, and said controller is embedded in one or more integrated

circuit chips.

See claim 25. (EX1002, ¶195.)

19. Claim 49

a) The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured or configurable for monitoring or measuring traffic passed through, received by or transmitted by said broadband wireless repeater or relay.

See claim 26. (EX1002, ¶196.)

20. Claim 50

a) The broadband wireless repeater or relay of claim 29, wherein said broadband wireless repeater or relay is configured or configurable to modify at least some received signals or data from one or more devices, users or networks and transmit modified or delayed signals or data to at least one device, network or user via wireless communication.

See claim 27. (EX1002, ¶197.)

21. Claim 51

a) The broadband wireless repeater or relay of claim 29, wherein said controller and one or more of said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission are integrated.

See claim 28. (EX1002, ¶198.)

X. GROUND 4: Ganz, Larrick, Roese, and Perlman in Combination with Engels Renders Claims 41-42, 44-45, and 52-63 Obvious

A. Overview and Motivation to Combine

Section VIII.A describes that a POSITA would have been motivated to modify Ganz/Larrick/Roese to include Perlman's teachings. Section IX.A describes that a POSITA would have been motivated to modify Ganz/Larrick/Roese to include Engelman's teachings. Similarly, for the reasons discussed above, a POSITA would have been motivated to modify Ganz/Larrick/Roese/Perlman to include Engel's teachings. (EX1002, ¶199.)

For the reasons discussed above, a POSITA would have had a reasonable expectation of success combining Ganz/Larrick/Roese/Perlman with Engels. A POSITA would have been well aware of the conventional ways of implementing the standard technologies discussed therein. Implementation would have been well-within the skill of an ordinary artisan. (EX1002, ¶200.)

B. Limitation-By-Limitation Analysis

1. Claim 41

a) The broadband wireless repeater or relay of claim 29, wherein said controller is self-configurable.

See claim 18. (EX1002, ¶201.)

2. Claim 42

a) The broadband wireless repeater or relay of claim 29, wherein at least one of said receiver or transceiver for

signal or data reception, at least one of said transmitter or transceiver for signal or data transmission, or said controller is configured for operation in at least one of said one or more wireless networks in a moving platform environment.

See claim 19. (EX1002, ¶202.)

3. Claim 44

a) The broadband wireless repeater or relay of claim 29, wherein … transceiver … or said controller is configured for operation in at least one of said one or more wireless networks in an indoor environment.

See claim 21. (EX1002, ¶203.)

4. Claim 45

a) The broadband wireless repeater or relay of claim 29, wherein … transceiver … or said controller is configured for operation in at least one of said one or more wireless networks in an outdoor environment.

See claim 22. (EX1002, ¶204.)

5. Claim 52

a) 52[pre]: A broadband wireless repeater or relay, comprising:

See limitation 1[pre]. (EX1002, ¶205.)

b) 52[a]: at least one receiver or transceiver for signal or data reception from one or more devices;

See limitation 1[a]. (EX1002, ¶206.)

c) 52[b]: at least one transmitter or transceiver for signal or data transmission to one or more devices,

See limitation 1[b]. (EX1002, ¶207.)

d) 52[c]: wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and

See limitation 1[c]. (EX1002, ¶208.)

e) 52[d]: a controller …, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,

See limitation 1[d]. (EX1002, ¶209.)

f) 52[e]: wherein at least one of said receiver or transceiver … and said transmitter or transceiver … either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,

See limitation 1[e]. (EX1002, ¶210.)

g) 52[f]: wherein said broadband wireless repeater or relay is connected or connectable to one or more network backbones for connecting said one or more wireless networks with said one or more network backbones,

See limitation 1[f]. (EX1002, ¶211.)

h) 52[g]: wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices,

See limitation 1[g]. (EX1002, ¶212.)

i) 52[h]: wherein said repeater or relay is configured such that when in a network which includes one or more devices which can transmit or receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more at least one of said one or more devices has at least one of

Limitations 52[d] and 52[f] describe that devices that can transmit or receive are configured for operation in a network. Limitation 52[e] further describes that at least one of the devices has a transmitter and/or receiver that occupies the required bandwidth and transmits data at the required speed. As described below, at least one or more of the devices performs the following limitations. (EX1002, ¶213.)

j) 52[i]: a higher data rate,

Ganz discloses software that performs "monitoring and control" of its WBCR that periodically measures "throughput speeds and data packet drop rates" in the system. (EX1005, 5:47-54.) The software can then perform "controlling functions" that provides for "remote dynamic load balancing among the users, and individually enhancing or reducing the allowable user packet size requests, thereby ensuring efficient network utilization for all users." (EX1005, 5:55-61.) A POSITA would understand that this "load balancing" and "efficient network utilization" results in higher data rates for one or more devices within the network than if the WBCR was not present in the network. (EX1002, ¶214.)

k) 52[j]: a greater coverage distance,

Perlman identifies the problem of degradation of high-bandwidth data transmissions "by the physical distance between the access point and the mobile terminal or other device." (EX100X, [0006].) To address this, Perlman's system "achieves ***full range coverage in the home without bandwidth loss*** by utilizing a different channel for each data packet hop. This feature allows repeater data packets to overlap in time...." (EX100X, [0059].) Thus, Perlman teaches use of a repeater that is configured such that when in a network at least one of said one or more devices has a greater coverage distance than if the repeater or relay was not present in said network. (EX1002, ¶215.)

l) 52[k]: higher quality of transmission or reception,

Ganz explains that its quality of service (QoS) software module "includes bandwidth management functions that provide traffic control of the WBCR, allowing improved network performance while enforcing traffic flows and other network policies." (EX1005, 10:52-54.) The QoS module uses "prioritization of data," in order to "distinguish between time-sensitive traffic and non-time sensitive traffic and to give the former higher priority." (EX1005, 11:5-7.) For example, "[t]he successful deployment of real-time applications such as voice and video may require that the WBCR provide a specific QoS for different applications." (EX1005, 11:14-17.) Thus, Ganz discloses that its WBCR optimizes the quality of transmission or reception to user devices, and said devices have a higher quality of transmission or

reception than if the WBCR was not present in the network. (EX1002, ¶216.)

m) 52[l]: less interference, and

Ganz discloses that its WCBR contains a "radio/data link element," which "preferably employs spread spectrum transmission, either using frequency hopping or direct sequence coding schemes," which "***decreases the chances of radio frequency jamming/interference, detection and interception of radio frequencies and provides for the capability of encryption***." (EX1005, 7:6-11.) Thus, Ganz teaches use of a repeater that is configured such that when in a network at least one of said one or more devices has less interference than if the repeater or relay was not present in said network. (EX1002, ¶217.)

n) 52[m]: an improved ability to control its capacity,

Ganz explains that "***[t]he WBCR may also be segregated into multiple tiers or layers when a segment on a user end approaches capacity***." (EX1005, 5:33-34.) Thus, "[i]f there is a high volume of users that significantly exceed a 2-5% loading factor, separate segments may be dedicated to the users." (EX1005, 5:34-37.) Depending on the specific application, segregation can be accomplished at the radio datalink level by: "(1) assigning another spread spectrum chip code to that link, thereby providing isolation from other radios on the network; (2) operating a new segment on a different radio frequency; and (3) attaching directionally controlled antennas to the radios, thereby providing for spatial diversity." (EX1005, 5:40-46.)

Thus, a POSITA would understand that a network implementing Ganz's WBCR would have an improved ability to control its capacity than if the WBCR was not present in said network. (EX1002, ¶218.)

o) 52[n]: than if said repeater or relay was not present in said network.

See limitations 52[i-m]. (EX1002, ¶219.)

6. Claim 53

a) The broadband wireless repeater or relay of claim 52, … a higher data rate….

See limitation 52[i]. (EX1002, ¶220.)

7. Claim 54

a) The broadband wireless repeater or relay of claim 52, … a greater coverage distance….

See limitation 52[j]. (EX1002, ¶221.)

8. Claim 55

a) The broadband wireless repeater or relay of claim 52, … higher quality of transmission….

See limitation 52[k]. (EX1002, ¶222.)

9. Claim 56

a) The broadband wireless repeater or relay of claim 52, … has less interference….

See limitation 52[l]. (EX1002, ¶223.)

10. Claim 57

a) The broadband wireless repeater or relay of claim 52, … an improved ability to control its capacity….

See limitation 52[m]. (EX1002, ¶224.)

11. Claim 58

a) 58[pre]: A broadband wireless repeater or relay, comprising:

See limitation 1[pre]. (EX1002, ¶225.)

b) 58[a]: at least one receiver or transceiver for signal or data reception from one or more devices;

See limitation 1[a]. (EX1002, ¶226.)

c) 58[b]: at least one transmitter or transceiver for signal or data transmission to one or more devices,

See limitation 1[b]. (EX1002, ¶227.)

d) 58[c]: wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and

See limitation 1[c]. (EX1002, ¶228.)

e) 58[d]: a controller …, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,

See limitation 1[d]. (EX1002, ¶229.)

f) 58[e]: wherein at least one of said receiver or transceiver … and said transmitter or transceiver …

either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,

See limitation 1[e]. (EX1002, ¶230.)

g) 58[f]: wherein said repeater or relay employs MIMO or adaptive antenna technology,

See claim 17. (EX1002, ¶231.)

h) 58[g]: wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities…, and

See limitation 52[g]. (EX1002, ¶232.)

i) 58[h]: wherein said repeater or relay is configured such that when in a network which includes one or more devices which can transmit or receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more at least one of said one or more devices has at least one of

See limitation 52[h]. (EX1002, ¶233.)

j) 58[i]: a higher data rate,

See limitation 52[i]. (EX1002, ¶234.)

k) 58[j]: a greater coverage distance,

See limitation 52[j]. (EX1002, ¶235.)

l) 58[k]: higher quality of transmission or reception,

See limitation 52[k]. (EX1002, ¶236.)

m) 58[l]: less interference, and

See limitation 52[l]. (EX1002, ¶237.)

n) 58[m]: an improved ability to control its capacity,

See limitation 52[m]. (EX1002, ¶238.)

o) 58[n]: than if said repeater or relay was not present in said network.

See limitation 52[n]. (EX1002, ¶239.)

12. Claim 59

a) The broadband wireless repeater or relay of claim 58, … a higher data rate….

See claim 53. (EX1002, ¶240.)

13. Claim 60

a) The broadband wireless repeater or relay of claim 58, … a greater coverage distance …..

See claim 54. (EX1002, ¶241.)

14. Claim 61

a) The broadband wireless repeater or relay of claim 58, … have higher quality of transmission or reception….

See claim 55. (EX1002, ¶242.)

15. Claim 62

a) The broadband wireless repeater or relay of claim 58, … has less interference….

See claim 56. (EX1002, ¶243.)

16. Claim 63

a) The broadband wireless repeater or relay of 58, … an improved ability to control its capacity….

See claim 57. (EX1002, ¶244.)

XI. CONCLUSION

For at least the foregoing reasons, this Petition should be instituted.

Respectfully submitted,

Date: October 22, 2025

/s/ James M. Glass

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CERTIFICATION UNDER 37 C.F.R. § 42.24

Under the provisions of 37 C.F.R. § 42.24, the undersigned hereby certifies that the word count for the foregoing Petition for *inter partes* review (excluding the table of contents, table of authorities, mandatory notices, certificate of service or word count, and appendix of exhibits or claim listing) totals 13,975 words, which is within the word limit allowed under 37 C.F.R. § 42.24(a)(1)(i).

Date: October 22, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e), 42.105(a), the undersigned hereby certifies service on the PO of a copy of this Petition and its respective exhibits at the official correspondence address for the attorneys of record for the '337 patent as shown in USPTO PAIR via FedEx:

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