UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

T-Mobile USA, Inc., AT&T Services Inc., AT&T Mobility LLC, AT&T Corporation, Cellco Partnership d/b/a Verizon Wireless, Nokia of America Corporation, Ericsson Inc.
Petitioners

v.

Cobblestone Wireless LLC
Patent Owner

Case IPR2024-00137
Patent 9,094,888

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,094,888

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 9,094,888 ("'888 Patent")
1002	Prosecution History for 9,094,888
1003	U.S. Patent Publication No. 2006/0111149A1 ("Chitrapu")
1004	Intentionally Omitted
1005	Expert Declaration of James Proctor
1006	Expert Declaration of Benoist Sébire on the Prior Art Status of TS 36.300
1007	IBM International Technical Support Organization, *An Introduction to Wireless Communications*, 2d ed. (October 1995)
1008	Taylor, M.S. et al., *Internet Mobility: The CDPD Approach* (June 11, 1996)
1009	Steele et al., *GSM, cdmaOne and 3G Systems* (2001)
1010	Sesia, S. et al., *LTE – The UMTS Long Term Evolution*, 2d ed. (2011)
1011	3GPP 23.401 V10.3.0 (March 2011)
1012	*Cobblestone Wireless, LLC v. T-Mobile USA, Inc.*, No. 2:22-cv-00477-JRG-RSP (Lead Case), Dkt. 62, Docket Control Order
1013	Katherine K. Vidal, *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022)
1014-1200	Intentionally Omitted
1201	3GPP Partnership Project Description

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1202	3GPP Working Procedures 2022
1203	Introducing 3GPP Webpage
1204	Recommendation for IPv6 in 3GPP Standards (Archived)
1205	Myung, H. & Goodman, D., *Single Carrier FDMA – A New Air Interface for Long Term Evolution* (2008)
1206	RAN WG2 Homepage
1207	RAN2 Meeting #73 (Taipei) Participants List
1208	3GPP FAQs (Archived Webpage - 2008)
1209	3GPP Specifications (Archived Webpage - 2008)
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1211	3GPP Index of ftp Specs (Archived Webpage - 2008)
1212	3GPP Specification Numbering (Archived Webpage - 2008)
1213	3GPP Specification Series (Archived Webpage - 2008)
1214	3GPP Version Numbering Scheme (Archived Webpage - 2008)
1215	Hillebrand, F., ed., *GSM and UMTS: The Creation of Global Mobile Communication* (2002)
1216	3GPP Partners Webpage
1217	3GPP Homepage (Archived Webpage – February 2011)
1218	3GPP Advanced Search (Archived Webpage – March 2011)
1219	3GPP FTP Index (Archived Webpage – 2008)

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1224	3GPP FTP TS 36.300 Directory Listing
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1229	*Curriculum Vita* of James Proctor

LISTING OF CHALLENGED CLAIMS

Cl. No.	Elem.	Claim Language
9	[9.pre]	A method implemented at a first wireless network for a mobile wireless device handoff between a second wireless network and the first wireless network, the method comprising
	[9.a]	receiving a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network;
	[9.b]	based, at least in part, on the handoff request, adapting one or more beams of an antenna array to facilitate coverage of the wireless device by the first wireless network; and.
	[9.c]	transmitting a confirmation from the first wireless network to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.
10	[10]	A method according to claim 9, wherein the receiving the handoff request comprises receiving the handoff request via a wireless or a wired communication link that communicatively couples the first wireless network to the second wireless network
12	[12]	A method according to claim 9, wherein the adapting one or more beams comprises adapting one or more beams based, at least in part, on one of a predetermined network load placed on the first wireless network due to the handoff of the wireless device ***or*** an effect of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network.
20	[20.pre]	A system for a wireless device handoff between a first wireless network and a second wireless network, the system comprising:
	[20.a]	an antenna array configured to generate one or more adaptable beams to modify a coverage area for the first wireless network; and
	[20.b]	an adaption manager having logic, the logic configured to:
	[20.c]	receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network
	[20.d]	cause a beam from among the one or more adaptable beams to be adapted in order to enable the wireless device to be covered by the first wireless network, and
	[20.e]	transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.
21	[21]	A system according to claim 20, wherein to receive the handoff request comprises to receive the handoff request via a wireless or a wired communication link that communicatively couples the first wireless network to the second wireless network.
23	[23]	A system according to claim 20, wherein to cause the beam to be adapted comprises to cause a beam to be adapted based, at least in part, on one of a network load placed on the first wireless network due to the handoff of the wireless device or an impact of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network

T-Mobile USA, Inc., AT&T Services Inc., AT&T Mobility LLC, AT&T Corporation, Cellco Partnership d/b/a Verizon Wireless, Nokia of America Corporation, Ericsson Inc., ("Petitioners") petition for *inter partes review* of Claims 9, 10, 12, 20, 21 and 23 ("Challenged Claims") of U.S. Patent No. 9,054,888 ("'888 Patent").

I. INTRODUCTION

The Challenged Claims of the '888 Patent are directed to a handover method for base stations that have the ability to change their geographic coverage area. Handover is a process where a wireless device's connection to a network through a base station (referred to as a source base station) is transferred to a new base station (referred to as a target base station). Handover is a fundamental process to wireless and cellular communications that has been part of every major cellular standard. The '888 Patent is directed a very specific type of handover, whereby a target network adapts its coverage area to account for a wireless device (*e.g.*, a cell phone) that is not currently within the target base station's coverage area. According to the Challenged Claims, the determination of whether to adapt the target coverage area is made by the source base station (*i.e.*, the base station that is currently in communication with the device).

This adaptive handover, however, was not new. Chitrapu discloses the exact same problem and the exact same solution as the '888 Patent. Specifically, Chitrapu

discloses a "smart" handover between base stations capable of dynamically changing their coverage area. Chitrapu expressly describes that a source base station can consider load balancing and the location of a UE in determining whether to adapt the coverage of a target base station during handover. Chitrapu also discloses that the details of the messaging between a source base station and target base station could follow the standard handover messaging protocols described in the 3GPP technical specifications. TS 36.300 is an example of a 3GPP technical specification, and it discloses the standard messaging protocols for handover in LTE.

Thus, Chitrapu in combination with the TS 36.300 render obvious the Challenged Claims of the '888 Patent.

II. MANDATORY NOTICES

REAL PARTIES IN INTEREST: The real party in interest is T-Mobile USA, Inc., AT&T Services Inc., AT&T Corp., AT&T Mobility LLC, Cellco Partnership d/b/a Verizon Wireless, Nokia of America Corporation, Ericsson Inc. 37 C.F.R. § 42.8(b)(1).[1] To avoid additional issues associated with real parties in interest,

[1] Out of an abundance of caution, Petitioners identify all current defendants in the below identified cases as potential real parties in interest only for the purpose of this proceeding and only to the extent that Patent Owner contends that these

Petitioners likewise identify Samsung Electronics Co., Ltd. because its products are accused of infringement in the AT&T, T-Mobile, and Verizon actions, and Samsung Electronics Co., Ltd. has been named as a defendant in the litigation listed below.

RELATED MATTERS:

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioners are aware of the following pending patent infringement lawsuits or related matters involving the '888 Patent:

- *Cobblestone Wireless, LLC v. T-Mobile USA, et al.*, No. 2:22-cv-00477 (E.D. Tex.) filed December 16, 2022;
- *Cobblestone Wireless, LLC v. Verizon Communications Inc., et al.*, No. 2:22-cv-00478 (E.D. Tex.) filed December 16, 2022;

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separate legal entities should be named real parties in interest in this IPR. Petitioners do so to avoid the potential expenditure of resources to resolve such a challenge. Petitioners also acknowledge that each petitioner has a number of affiliates. No unnamed entity is funding, controlling, or otherwise has an opportunity to control or direct this Petition or Petitioner's participation in any resulting IPR. Petitioners are also not aware of any affiliate that would be barred from filing this Petition under 35 U.S.C. § 315(e).

- *Cobblestone Wireless, LLC v. AT&T Inc. et al.*, No. 2:22-cv-00474 (E.D. Tex.) filed December 15, 2022; and
- *Cobblestone Wireless, LLC v. Samsung Electronics Co., Ltd. et al.*, No. 2:23-cv-00285 (E.D. Texas) filed June 16, 2023.

LEAD AND BACKUP COUNSEL: Petitioners provide the following designation and service information for lead and back-up counsel. 37 C.F.R. § 42.8(b)(3) and (b)(4).

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SERVICE INFORMATION: Petitioners consent to electronic service by email at the email addresses: A&BCobblestone@alston.com

III. STANDING UNDER 37 C.F.R. §42.104(a)

Petitioners certify that the '888 Patent is available for *inter partes* review. Petitioners also certify that they are not barred or estopped from requesting this *inter partes* review on the grounds identified herein. Neither Petitioners, nor any party in privity with Petitioners: (i) have filed a civil action challenging the validity of claims 9, 10, 12, 20, 21, 23 of the '888 Patent; (ii) have been served a complaint alleging infringement of the '888 Patent more than one year prior to the present date; or (iii) are estopped from challenging the claims on the grounds identified in the Petition. Claims 9, 10, 12, 20, 21, 23 of the '888 Patent also have not been the subject of a prior IPR or a finally concluded district court litigation.

IV. STATEMENT OF RELIEF REQUESTED

Petitioners request *inter partes* review and cancellation of challenged claims 9, 10, 12, 20, 21 and 23 based on the detailed statements presented below.

V. PAYMENT OF FEES UNDER 37 C.F.R. § 42.103

Petitioners authorize Account No. 16-0605 to be charged for any fee set forth in 37 C.F.R. § 42.15(a) and for any additional fees.

VI. IDENTIFICATION OF CHALLENGE

Petitioners request *inter partes* review on the below grounds. Per 37 C.F.R. § 42.6(c), copies of the references are filed with this petition. In support of these grounds, this petition is accompanied by a Declaration of Mr. James A. Proctor.

Ground	'888 Patent Claims	Basis for Ground
1	9, 10, 12, 20, 21, 23	Obvious over U.S. Patent Publication No. 2006/0111149A1 to Chitrapu et al., (Chitrapu) in combination with 3GPP Technical Specification 36.300 V10.3.0 (TS 36.300).

As stated on the face of the patent, the earliest priority date of the '888 patent is April 29, 2011. Each of the relied upon references is prior art to this patent for the reasons stated below.

Chitrapu (Ex. 1003): U.S. Patent Publication No. 2006/0111149A1 to Chitrapu et al. ("Chitrapu"), titled "System and Method Utilizing Dynamic Beam Forming for Wireless Communication Signals," was filed on December 22, 2005, and is a continuation of a patent application that was filed on November 27, 2002. Chitrapu published on May 25, 2006, and thus is prior art under at least 35 U.S.C. § 102(b).

TS 36.300 (Ex. 1223): 3GPP TS 36.300 V10.3.0 is a version of a technical specification for the Long Term Evolution ("LTE") standard developed and

maintained by the 3rd Generation Partnership Project ("3GPP"). This specification was developed by the Technical Specification Group (TSG). The TSG deliverables are published and publicly available on the 3GPP website. Ex. 1006, ¶¶26-27, *see also* Ex. 1201-28. Technical Specification (TS) 36.300 was publicly available at least as early as it was published on April 5, 2011. Ex. 1006, ¶¶49-57; *see also* Ex. 1201-28. Therefore, TS 36.300 is prior art under at least 35 U.S.C. § 102(a).

VII. BACKGROUND

A. Person of Ordinary Skill in the Art

A POSITA at the time of the alleged invention of the '888 Patent would have had at least a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent, and at least two years of experience working in the field. Ex. 1005, ¶41. Relevant working experience would include experience with telecommunications and networking, radio-access network architectures, protocols and signal propagation, and including handovers in wireless networks. Ex. 1005, ¶41. More education can supplement practical experience and vice versa. Ex. 1005, ¶41.

B. Handover

At the time the '888 Patent was filed, a POSITA would have known that cellular network operators had deployed multiple types of networks in the United States. For example, networks operating according to the Third-Generation (3G)

standards, such as Universal Mobile Telecommunications System (UMTS) and CDMA2000, had been deployed in the United States for almost a decade, and US network operators had also widely deployed networks operating according to Fourth-Generation (4G) standards, such as Long Term Evolution or LTE. Ex. 1005, ¶60.

For a wireless device (also known as user equipment or UE), handover ensures that a UE can maintain an ongoing communication session while moving between different cells or coverage areas. Ex. 1005, ¶61.

Examples of handover procedures are implemented in every major cellular technology, including GSM, UMTS, and 4G LTE. Ex. 1005, ¶62. These handover processes were standardized by 3GPP (3rd Generation Partnership Project[2]) and have been widely implemented in 3G and 4G networks. Ex. 1005, ¶62. The reason that the standards provided for different handover procedures is that slightly different procedures may be used depending on the destination of the cellular devices. Ex. 1005, ¶¶63-65 (listing two types of handover). The following provides

[2] 3GPP is a standards setting organization that releases technical specifications (TS) that cover cellular telecommunications technologies. Ex. 1005, ¶¶56-57.

examples of the types of handover procedures available in the prior art LTE standard and that would have been known to a POSITA.

Intra-RAT Handover. An intra-RAT handover is a type of handover where a UE is handed off from a base station to another base station that are operating using the same radio access technology (or RAT). In one example of an intra-RAT handover, intra-LTE handover, a UE is handed off from one base station (referred to as an eNodeB) within an LTE network to another base station within the same LTE network. During this handover, an on-going connection with the LTE network is maintained. Ex. 1005, ¶64.

Inter-RAT handover. In this type of handover, a UE is handed off from a base station operating according to one type of RAT (e.g. 4G LTE) to a base station operating according to a different type of RAT (e.g., 3G UMTS). Ex. 1005, ¶65. The ability to perform inter-RAT handovers is fundamental to the operation of cellular devices prior to the '888 Patent. A POSITA would have known that, prior to the '888 Patent, network operators in the United States typically operated multiple networks. For example, in 2011, network operators had a robust 3G networks throughout the United States and had begun building 4G networks on top of the 3G networks in major metropolitan cities. As result, a POSITA would have known that UEs in 2011 were often compatible with 3G and 4G networks. This concept is known as "backward compatibility." Ex. 1005, ¶65.

A POSITA would have recognized that as a UE moved in and out of certain coverage areas (e.g., entering or leaving a city with 4G coverage), the UE would move between 4G and 3G coverage. In order to ensure seamless service, (*e.g.*, prevent dropped calls) and in order to ensure UEs were receiving the highest level of service (*e.g.*, moving the UE to 4G service when it became available), the UE must have capable of handover between the different 3G and 4G wireless networks using the standardized inter-RAT handover procedure. Ex. 1005, ¶66.

C. The ’888 Patent

1. Description of the ’888 Patent’s Specification

The ’888 Patent is titled “Wireless Handoff Between Wireless Networks” and discloses methods and systems to facilitate handoff between a first and second wireless network. Ex. 1001, 3:27-30. Annotated Figure 1A below illustrates the concepts from the ’888 Patent.

Ex. 1001, Fig. 1A (annotated); Ex. 1005, ¶69

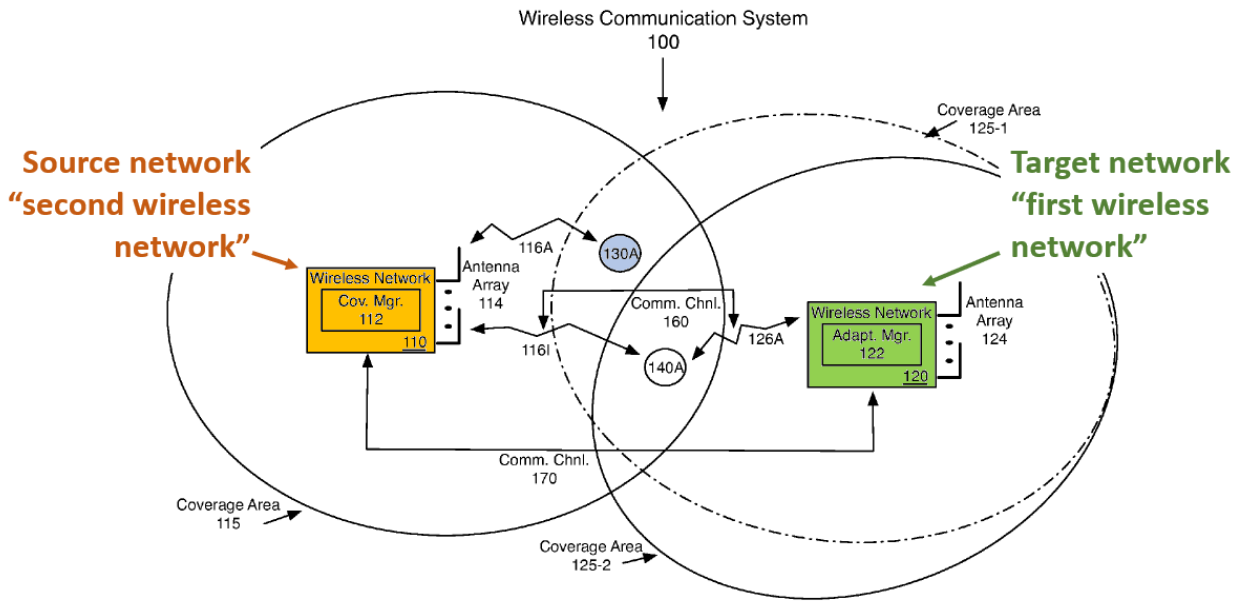


FIG. 1A

In Figure 1A, there are two wireless networks labeled 110 and 120, shown in orange and green respectively. The wireless device (e.g., UE) labeled 130A (for example) is shown in blue. In this figure, the UE is connected to the source network (called the "second wireless network" in the claims and shown in orange). The '888 Patent describes handover of a UE between the source network and a target wireless network 120 (called the "first wireless network" in the claims and shown in green).

As shown below, Figure 1A illustrates that the target wireless network has two potential "coverage areas": (i) 125-2 (shown cross-striped in orange) and (ii) 125-1 (shown cross-striped in blue).

Ex. 1001, Fig. 1A (annotated); Ex. 1005, ¶70

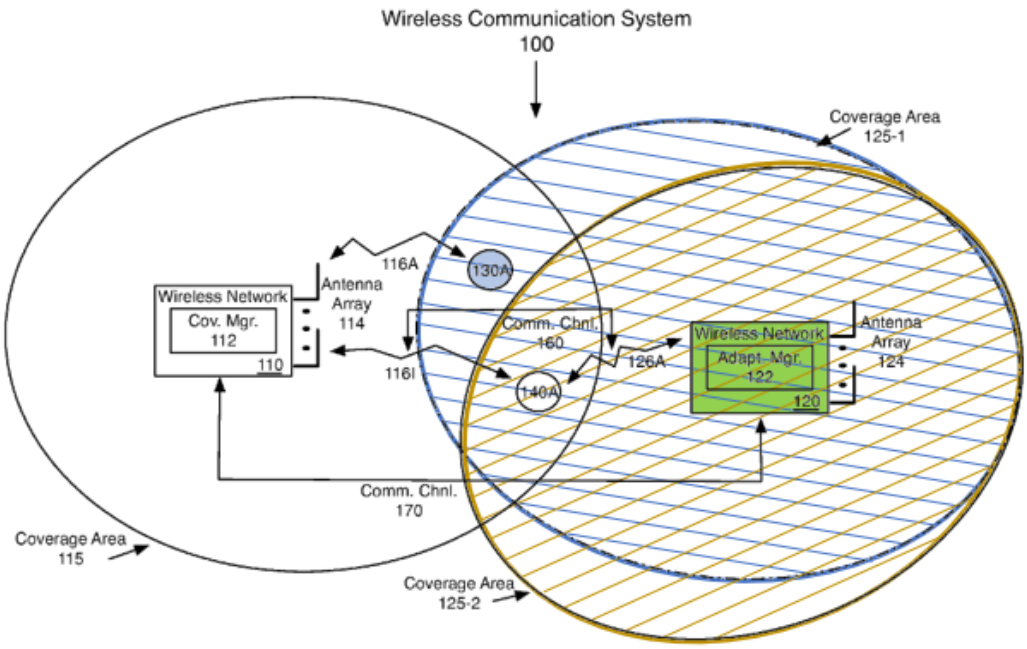


FIG. 1A

The ’888 Patent describes how, in Figure 1A, the target wireless network is operating with coverage area 125-2 (in orange). UE 130A (shown in blue) is not covered by coverage area 125-2 (in orange). Ex. 1001, 5:35-38. To facilitate the handover, the ’888 Patent describes that the target network must adapt its coverage area to 125-1 (in blue) to cover the UE 130A. To do so, the ’888 Patent describes adapting one or more beams of an antenna array to match coverage area 125-1. Ex. 1005, ¶71. The ’888 Patent discloses a series of “coverage managers” and “adaption managers” to negotiate and exchange information to accomplish this task. Ex. 1005, ¶72.

2. Claim Construction

In an *inter partes review,* claims are "construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b)." 37 C.F.R. §42.100(b). When a trial is instituted, claim terms must be given their plain ordinary and customary meaning as understood by a POSITA during the relevant timeframe in light of the specification and the prosecution history. *Id.; Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2015) (en banc); *see* 83 Fed. Reg. 51340.

Unless otherwise indicated in the discussion of the limitations below, Petitioners believe that the terms of the '888 Patent, for purposes of this proceeding, should be given their plain and ordinary meaning under the *Phillips* standard.

VIII. THE PRIOR ART

A. Chitrapu

Chitrapu discloses a beaming forming method used to dynamically shape cell coverage in conjunction with a "smart" handover mechanism. Ex. 1003, ¶¶[0008]-[0011].

As background, Chitrapu describes how prior art networks without dynamically changing coverage areas effectuate a handover. Referencing prior art Figure 1B, Chitrapu explains how, in conventional systems, the base stations have "strictly defined coverage areas" that typically overlap with adjacent base stations.

Ex. 1003, ¶[0071]. These prior art coverage areas of three base stations below are shown with different colors (blue, green, and orange):

Ex. 1003, Fig. 1B (annotated); Ex. 1005, ¶78

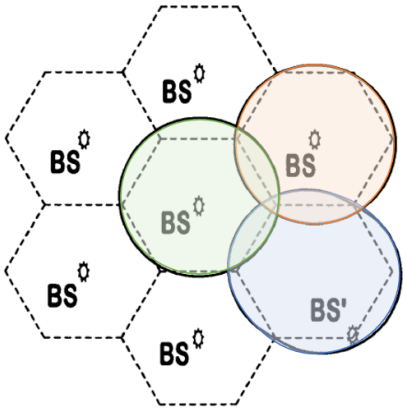


FIG. 1B
(PRIOR ART)

Chitrapu describes that, conventionally, "the overlap of beam coverage enables 'handover' of a communication being conducted by a mobile UE from one base station to another as the mobile UE travels from one cell to another." Ex. 1003, ¶[0008].

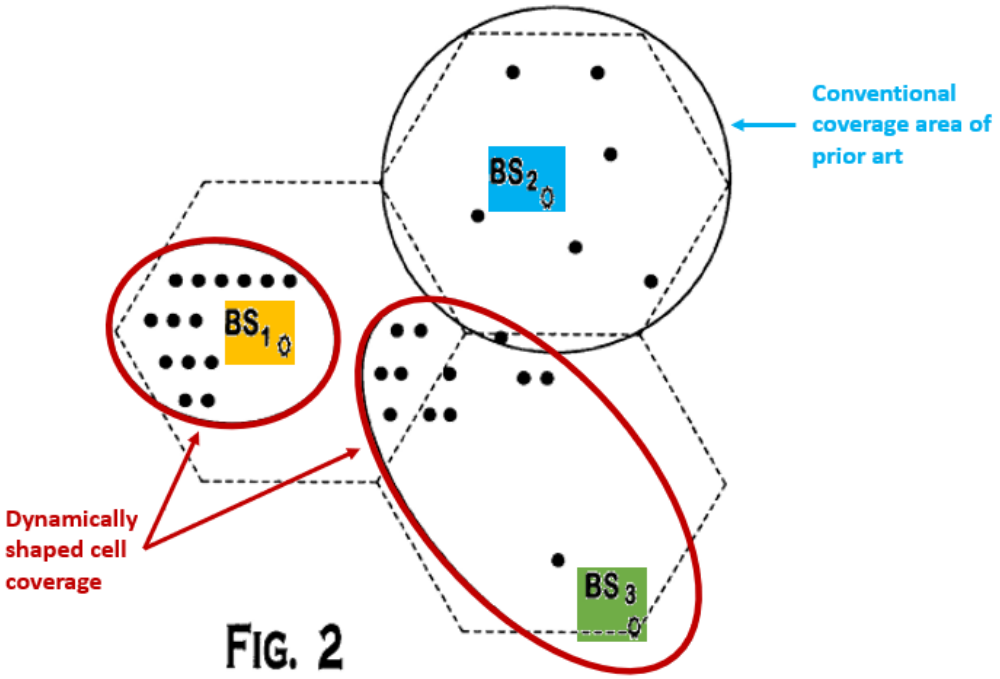
Chitrapu proposes two changes to improve on these conventional systems: (i) dynamically shaping cell coverage, and (ii) "smart handover." Ex. 1003, ¶[0011].

1. Chitrapu's Dynamic Shaping of Cell Coverage

First, Chitrapu discloses "dynamically shaping of cell coverage" instead of maintaining "strict coverage areas." Ex. 1003, ¶[0071]; Ex. 1005, ¶81.

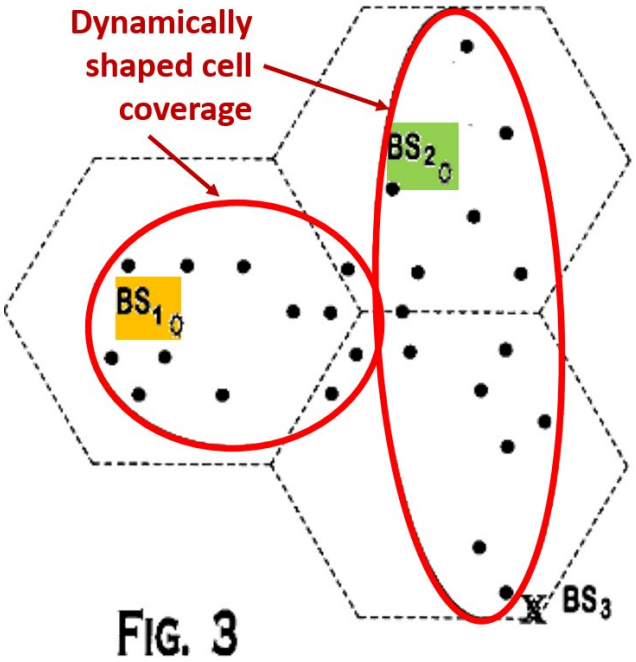
Dynamically shaping cell coverage is illustrated using Figure 2 and Figure 3 in Chitrapu. For example. Figure 2 is shown below to illustrate the coverage areas of two base stations (BS1, BS2, and BS3):

Ex. 1003, Fig. 2 (annotated); Ex. 1005, ¶82



In Figure 2, Chitrapu discloses a concentration of users around base station 1 (BS1 shown in orange). Ex. 1003, ¶[0075]. Due to this concentration, BS1 and adjacent BS3 negotiate and dynamically change their coverage areas to accommodate the concentration of users. Ex. 1003, ¶[0075]. Figure 3 is shown below illustrates this change:

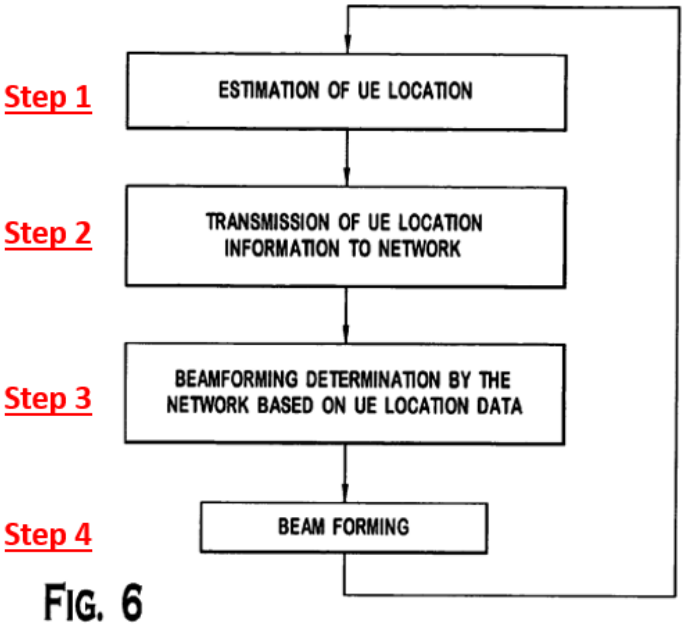
Ex. 1003, Fig. 3 (annotated); Ex. 1005, ¶84



"FIG. 3 shows a situation where base station BS3 has suffered a failure." Ex. 1003, ¶[0075]. "Base station BS1 and base station BS2 are then used to transmit a selectively shaped and directed beam to provide the needed radio resources to the users in the region normally served by base station BS3." Ex. 1003, ¶[0075]. Comparing Figure 2 and Figure 3 shows how the base stations can dynamically adjust their coverage area based on network conditions.

The process used to dynamically shape cell coverage is shown in Figure 6.

Ex. 1003, Fig. 6 (annotated); Ex. 1005, ¶86.



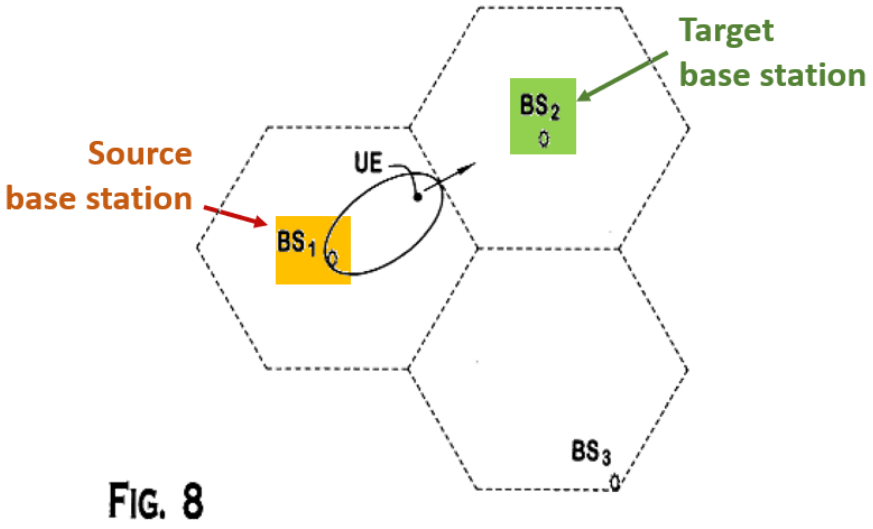
In the description of Figure 6, Chitrapu provides that the "first step consists of determination of location and/or locations of the targeted UE," which "is preferably achieved by using well known techniques including . . . such as GPS based methods." Ex. 1003, ¶[0082]. In step two, the network is then made aware of the location data for each UE by "an exchange of appropriately designed messages between the UE and the network." Ex. 1003, ¶[0082]. In step three, "the network determines the characteristics of the beam forming in order to serve the targeted UE(s) in a manner deemed appropriate and/or optimal by the network." Ex. 1003, ¶[0083]. As a result, "[o]nce the negotiation process is completed, the base stations refocus their transmitted RF signals to provide the beams for the UEs which are determined during the negotiation process." Ex. 1003, ¶[0083].

2. Chitrapu's Smart Handover

Second, Chitrapu discloses a "smart" handover, which allows handover to be facilitated using these dynamic coverage areas. Ex. 1003, ¶[0011]. This type of handover uses (i) UE geographical position, (ii) beam forming capabilities of neighboring cells, and (iii) a negotiation between base stations to determine the handover and beam shape of the various base stations. Ex. 1003, ¶¶[0011], [0105]; Ex. 1005, ¶91.

This "smart" handover technique is shown in Figure 8. In Figure 8 (shown below), the UE is communicating with a source base station (BS1 in orange) and moving toward a target base station (BS2 in green).

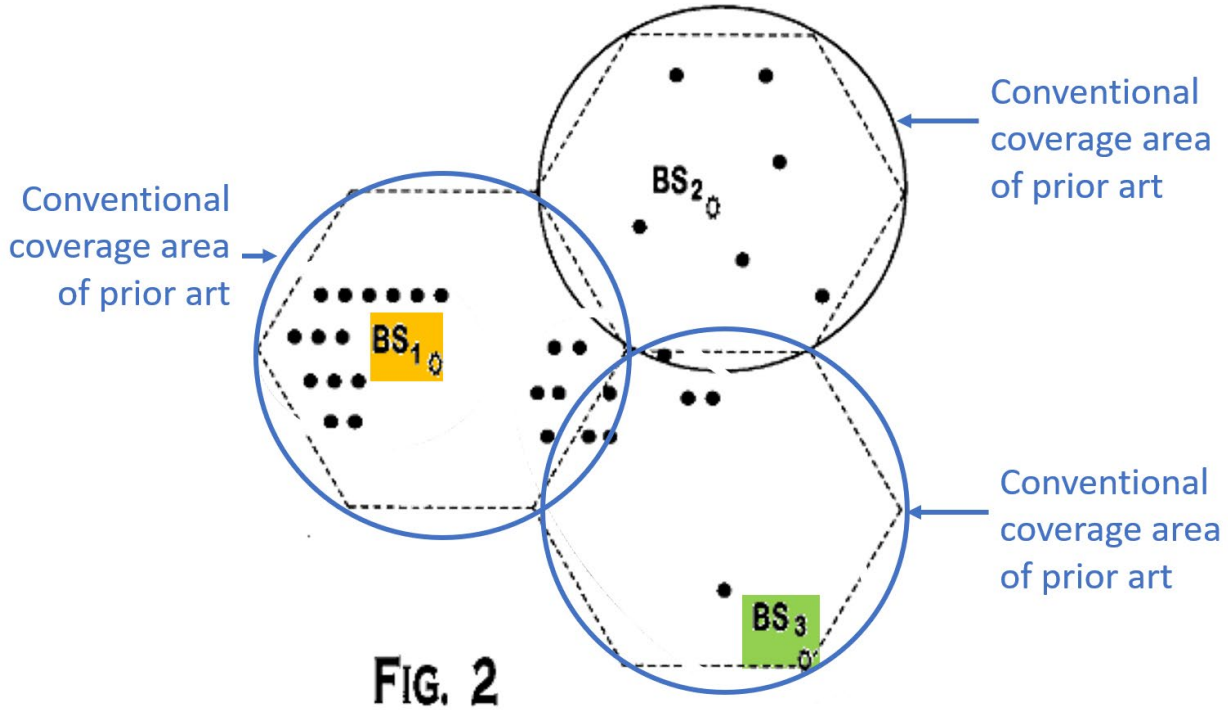
Ex. 1003, Fig. 8 (annotated); Ex. 1005, ¶92



In the "smart handover," Chitrapu discloses that the source base station BS1 makes the decision to perform the handover and selects the beams of the target base stations (e.g., BS2) to cover the UEs. Ex. 1003, ¶[0109]. Chitrapu states: "[T]he serving base station determines which base stations are to be involved and proceeds with the negotiation process to select[] a preferred beam allocation pattern for all of the involved base stations." Ex. 1003, ¶[0109]; *see also* Ex. 1003, Fig. 10, ¶[0107] (determining not to handover from BS1 to BS2).

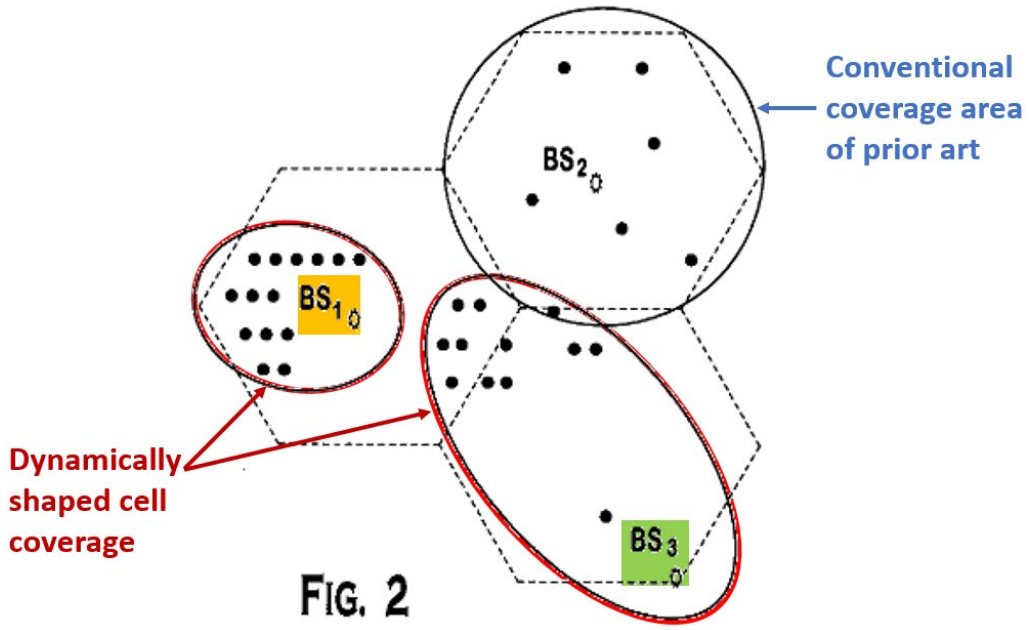
Mr. Proctor uses annotated versions Figure 2 in his declaration to illustrate how the coverage area of Figure 2 changes during a smart handover. For example, Mr. Proctor removed the coverage areas of Figure 2 and inserted an illustration of the conventional coverage area of the prior art (shown in blue).

Ex. 1003, Fig. 2 (annotated with dynamic coverage removed and conventional coverage shown); Ex. 1005, ¶95



Mr. Proctor then illustrated how the coverage areas were dynamically changed using the negotiation process described above. This dynamic change allows the network to adapt the beams of each base station to better manage the concentration of users around BS1.

Ex. 1003, Fig. 2 (annotated with dynamic coverage highlighted in red and green); Ex. 1005, ¶96



Comparing the two annotated figures shows how the coverage area of BS1 and BS3 dynamically change.

Lastly, while the specific messages used to negotiate and execute the handover are not directly disclosed in Chitrapu, Chitrapu discloses that its systems are constructed in accordance with "specifications of the 3rd Generation Partnership Program (3GPP)." Ex. 1003, ¶[0007]; Ex. 1005, ¶98.

B. TS 36.300 V10.3.0

As described in Section VII.B above, by 2011, various handover concepts were well-known in the art. Ex. 1005, ¶99. The details of the handover procedures were described in technical specifications (TS) published by standard setting organizations, like 3GPP. Ex. 1005, ¶99. A POSITA would have been aware of the

3GPP technical specifications and would have used them as a resource for designing a handset or base station compliant with the relevant standard. Ex. 1005, ¶100.

TS 36.300 V10.3.0 ("TS 36.300") is a technical specification produced by 3GPP that provides an overview and overall description of the Evolved Universal Terrestrial Radio Access Network's (E-UTRAN) radio interface protocol architecture. Ex. 1005, ¶101. The specification is part of the broader specifications that define 4G or LTE functionality.

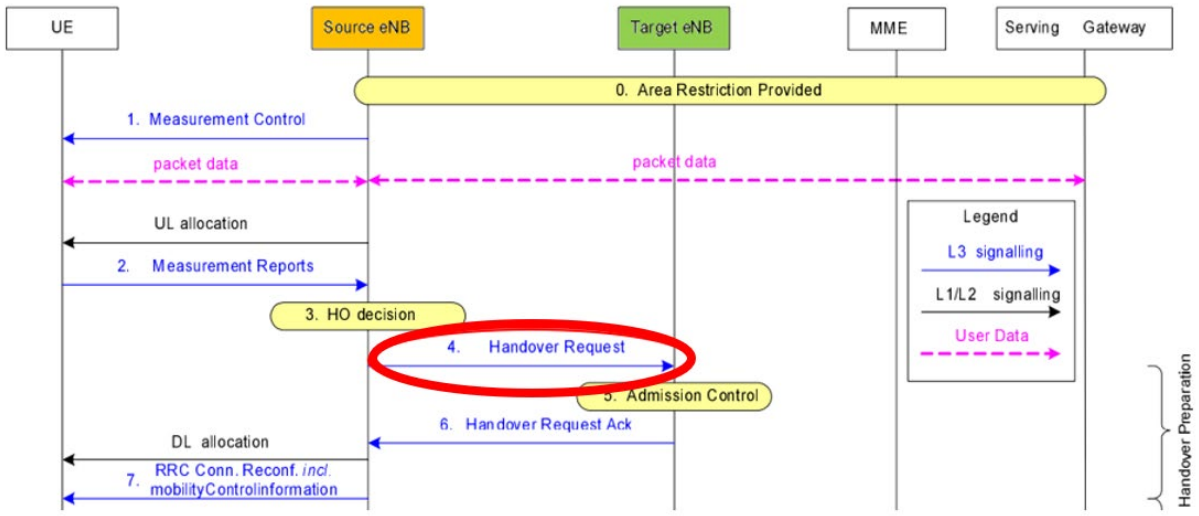
Section 10 of TS 36.300 describes mobility procedures for multiple different types of handovers. Ex. 1223 at 60; Ex. 1005, ¶102. For example, Section 10.1.2 describes intra-LTE handover (a type of intra-RAT handover between base stations within the same LTE network). Ex. 1005, ¶103. Section 10.2.2 describes certain details related to Inter-RAT handover (handover between base stations in different wireless networks such as a 4G LTE to 3G UMTS handover). Ex. 1223 at 77. TS 36.300, however, makes clear that "[s]imilar handover procedure should apply for both Inter RAT Handover and intra-LTE Handover." Ex. 1223 at 77. Thus, a POSITA would have understood that the details of handover described in Section 10.1.2 and 10.2.2. apply to Inter-RAT handover. Ex. 1005, ¶105.

Figure 10.1.2.1.1-1 illustrates the signal flow diagram applicable to Inter-RAT and Intra-RAT handover. Ex. 1005, ¶¶105-106. The illustration breaks the handover

process into three phases: (i) Handover Preparation, (ii) Handover Execution, and (iii) Handover Completion. Ex. 1005, ¶106.

First, the "Handover Preparation" phase shown below includes several messages such as the handover request (circled in red below):

Ex. 1223, Fig. 10.1.2.1.1-1 (partial and annotated); Ex. 1005, ¶107



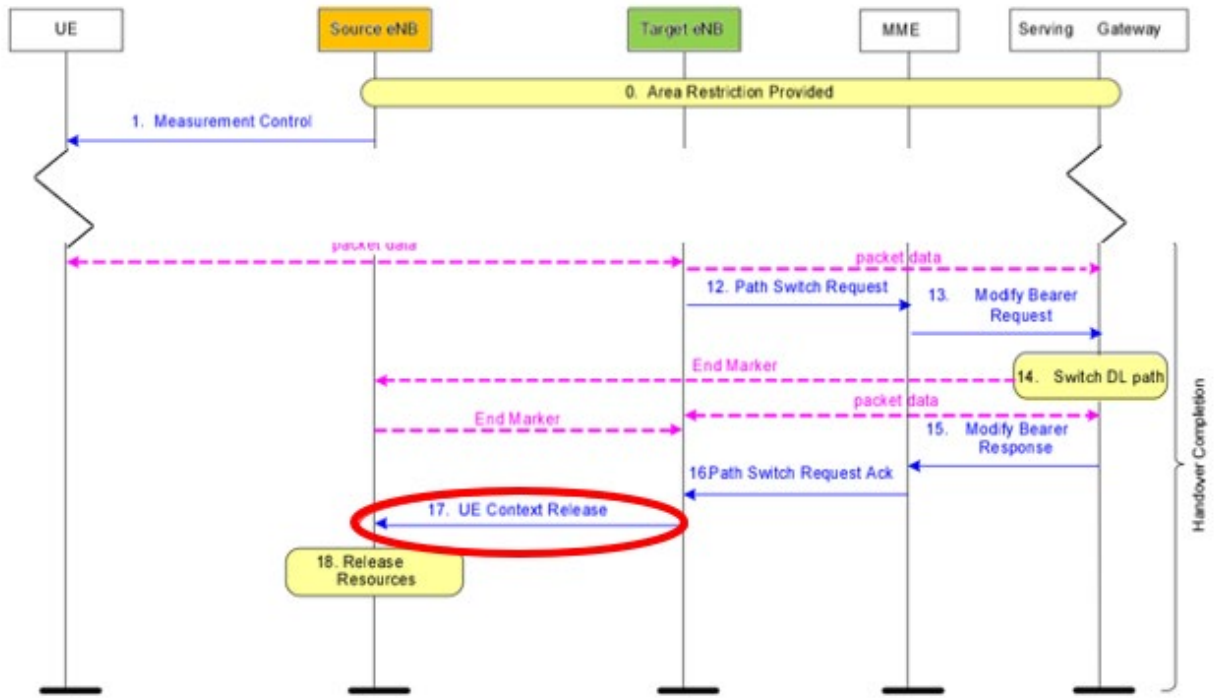
In messages 1 and 2, the UE and source base station (in orange) exchange measurement control and report messages, which provide the source base station with the conditions of the signal. Ex. 1223 at 63-64; Ex. 1005, ¶108. In step 3 (labeled "HO Decision"), the "[s]ource eNB makes decision based on MEASUREMENT REPORT and RRM information to hand off UE." Ex. 1223 at 63-64.

In message 4 (titled "Handover Request" circled in red), the "source eNB issues a HANDOVER REQUEST message to the target eNB [in green] passing necessary information to prepare the HO at the target side." Ex. 1223 at 63-64.

Second, in the "Handover Execution" phase (not illustrated here), the UE detaches from the old cell and synchronizes to a new cell. Ex. 1223 at 63-64; Ex. 1005, ¶111.

Third, in the "Handover Completion" phase illustrated below, the handover process is concluded using a series of messages.

Ex. 1223, Fig. 10.1.2.1.1-1 (partial and annotated); Ex. 1005, ¶112



Of particular relevance, in the Handover Completion phase at message 17 (circled in red), the "the target eNB informs success of HO to source eNB and triggers the release of resources by the source eNB." Ex. 1223 at 65.

C. Motivation to Combine

As discussed herein, a POSITA would have been motivated to combine Chitrapu's "smart handover" system, which expressly is "in accordance with ... 3GPP," with the handover messages defined in 3GPP's TS 36.300 to implement Chitrapu's "negotiation" and "execution" of device handover.

A POSITA would have been motivated to combine Chitrapu with TS 36.300 with a reasonable expectation of success. Ex. 1005, ¶114. Chitrapu discloses a "smart handover" mechanism that uses a "negotiation" and "execution" to implement a method to dynamically change cell coverage. Ex. 1003, ¶[0074]; Ex. 1003, Fig. 11; Ex. 1005, ¶115. A POSITA implementing the concepts from Chitrapu would have understood that a negotiation and execution of handover involves standardized messages between base stations. Ex. 1005, ¶115. Because LTE was the current technology being deployed in the United States, a POSITA would have been motivated to look to TS 36.300, which is an LTE specification, for details concerning implementation. Ex. 1005, ¶116. A POSITA would have expected to succeed in such a combination because 3GPP TS 36.300 describes standardized industry handover techniques, and Chitrapu explicitly suggests a POSITA look to 3GPP standards

because its states its "[s]ystems [are] constructed in accordance with current specifications of the 3rd Generation Partnership Program (3GPP)," such as TS 36.300. Ex. 1003, ¶[0007]; Ex. 1005, ¶117.

A POSITA looking at Chitrapu would have looked to TS 36.300 for several additional reasons. *First*, TS 36.300 describes standardized methods of handover for several different types of handover. Chitrapu's smart handover is not limited to any specific type of handover, and thus a POSITA would have looked to TS 36.300 as a source to identify the types of handover were in the art. Ex. 1005, ¶119. From there, a POSITA would have understood that handovers can either be Inter-RAT (between base stations with different RATs) or Intra-RAT (between base stations with the same RAT). Ex. 1005, ¶119. Given that TS 36.300 says the two types of handover are implemented in similar fashion, a POSITA would have expected to succeed in combining Chitrapu's smart handover with TS 36.300 and arrived at the Inter-RAT handover described in the '888 Patent. Ex. 1005, ¶119.

Second, TS 36.300 describes the steps of handover in greater detail than Chitrapu. Ex. 1005, ¶120. A serving base station in Chitrapu's handover procedure (i) determines the candidate base stations, (ii) negotiates handover between candidate base stations, (iii) determines the target base station, and (iv) executes the handover. Ex. 1005, ¶¶120-121. However, while Chitrapu describes the "negotiation" and "execution" of these steps at a high level, the specific

implementation details of these messages are not disclosed. TS 36.300 describes the implementation details—and the specific messages associated with that implementation—that were known in the art. Ex. 1005, ¶122. Thus, a POSITA looking at Chitrapu's disclosure would have immediately identified a problem—namely, that the specific implementation messages are not disclosed—and would have expected to succeed in implementing handover using the standardized messages of TS 36.300 because Chitrapu discloses its systems are constructed in accordance with "specifications of the 3rd Generation Partnership Program (3GPP)." Ex. 1003, ¶[0007]; Ex. 1005, ¶¶122-123. 3GPP TS 36.300 provides the messages, including specifically a handover request message, a UE context release message, and a handover acknowledgement. Ex. 1005, ¶123; Ex. 1223 at Fig.10.1.2.1.1-1. Additional motivations to combine are described below as part of the claim elements.

Third, Chitrapu and TS 36.300 are analogous art to the '888 Patent. As noted above, all three references deal with wireless communication, and in particular, wireless communication in accordance with industry standards such as 3GPP. Ex. 1001, 4:40-56; Ex. 1223 at 77; Ex. 1003, ¶[1007]; Ex. 1005, ¶124.

Fourth, a POSITA would have been able to combine Chitrapu and TS 36.300 with a reasonable expectation of success. As noted above, Chitrapu specifically states that its systems are built in accordance with "specifications of the 3rd

Generation Partnership Program (3GPP)." Ex. 1003, ¶[0007]; Ex. 1005, ¶123. A POSITA would have expected to succeed in executing Chitrapu's negotiation with the specific messages from the standards that Chitrapu specifically identified in the patent. Ex. 1005, ¶123.

Finally, Chitrapu sets forth a specific "smart handover" process that a POSITA would have been motivated to implement using the details of TS 36.300. In particular, Chitrapu's Figure 11 sets forth a series of steps that need modification in order to be effectively executed in a functioning network. Ex. 1005, ¶125.

Ex. 1003, Fig. 11.

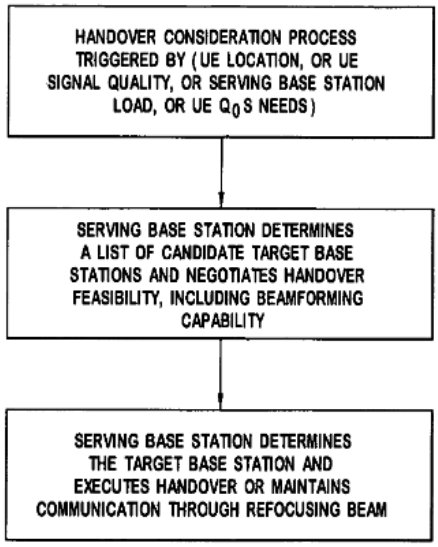


FIG. 11

For example, where Figure 11 states that the "serving base station determines a list of candidate target base stations and negotiates handover feasibility including beamforming feasibility" (in step two), a POSITA would have recognized that this

step requires the serving base station to determine whether candidate UEs are currently covered by a base station's beams and, if not, are capable of being covered by the base station's beams if the dynamic cell shaping of Chitrapu is applied. Ex. 1005, ¶¶125, 160-61; *see also* Ex. 1003, ¶[0109]. This determination means that the beam forming pattern of the target base station is performed before the handover process is "executed" in the third step of Figure 11 above. Ex. 1005, ¶125.

Once the beamforming pattern of the target base station is determined, a POSITA would have been motivated to look to standardized handover processes to figure out how to communicate that information to the target base station in order to "execute[]" the handover as taught in Chitrapu. Ex. 1005, ¶125. To communicate the beamforming pattern, a POSITA would have understood that messages would need to be exchanged between the source and target base station, and a POSITA would have understood that 3GPP defined standardized handover messaging for exchanging such information. Ex. 1005, ¶125. A POSITA would have understood that the handover process typically begins with a handover request message from the source base station to the target base station and would have considered it obvious to include information like beamforming information in the handover request to limit the number of messages required to complete the handover. Ex. 1005, ¶168. Once this information is communicated and the handover is complete, a POSITA would have also understood that the target base station would respond to the source base

station to communicate that the process is complete. Ex. 1005, ¶178. In this way a POSITA would again look to the standardized messaging of TS 36.300 to find the messages that communicate this information. Ex. 1005, ¶¶161-162.

Thus, a POSITA would have been motivated to implement Chitrapu's "execut[ion]" of the handover process using the standardized process of TS 36.300. Ex. 1005, ¶125.

IX. GROUND OF REJECTION

Chitrapu in view of TS 36.300 V10.3.0 renders claims 9, 10, 12, 20, 21 and 23 invalid as obvious under 35 U.S.C. § 103.

A. <u>Ground 1:</u> 9, 10, 12, 20, 21 and 23 are obvious in view of Chitrapu and in further view of TS 36.300 v10.3.0.

1. Independent claim 9

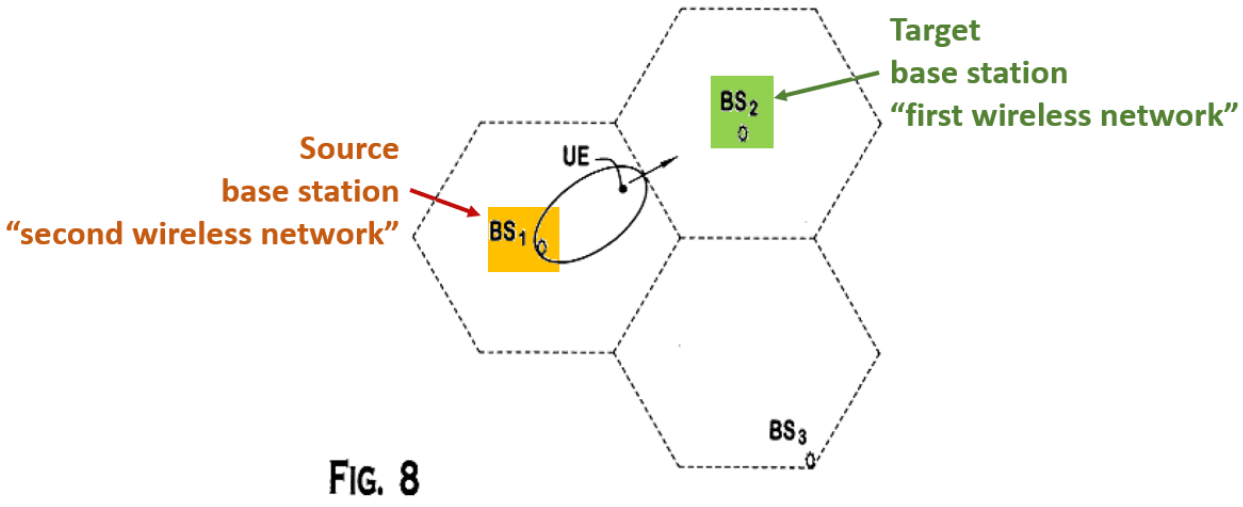
[9.p] A method implemented at a first wireless network for a mobile wireless device handoff between a second wireless network and the first wireless network, the method comprising:

To the extent the preamble is limiting, Chitrapu in combination with TS.36.300 renders obvious this claim limitation. Ex. 1005, ¶127. Chitrapu discloses a method for "smart handover" using dynamic cell coverage, and TS 36.300 discloses Inter-RAT handover between two wireless networks (e.g., a 3G network and 4G LTE network). Ex. 1003, ¶[0011]; Ex. 1223 at 77.

Figure 8 and the corresponding description in Chitrapu describe the smart handover using dynamic cell coverage. Ex. 1003, Fig. 8; Ex. 1005, ¶129. A POSITA

reading Chitrapu would have understood that its "smart handover" disclosure could apply to any of the types of handover known in the art. Ex. 1005, ¶130. While Chitrapu does not explicitly disclose that BS1 and BS2 are in different wireless networks, Chitrapu does not limit BS1 and BS2 to the same network. Ex. 1003, ¶[0009] (disclosing that BS1 and BS2 could be "*other types of antenna systems*." (emphasis added)); Ex. 1005, ¶130. For example, a POSITA reading Chitrapu would understand that the source base station BS1 could be part of one network (the "second wireless network" of the claim limitation in orange below), and the target base station BS2 could be part of another network (the "first wireless network" of the claim limitation in green below). Ex. 1005, ¶¶129-130.

Ex. 1003, Fig. 8 (annotated); Ex. 1005, ¶129



Moreover, it would have been obvious to a POSITA to modify Chitrapu to include Inter-RAT handover for a number of reasons. Ex. 1005, ¶131. *First*, at the

time of the '888 Patent, 3GPP standards disclosed a standardized Inter-RAT handover between 3G and 4G networks, and Chitrapu explicitly discloses that its systems are described in conjunction with the 3GPP standards Ex. 1003, ¶[0007]; Ex. 1223 at 76-77; Ex. 1005, ¶132. According to TS 36.300, handover is either Inter-RAT or Intra-RAT, and thus there are only two types of handover. Ex. 1005, ¶133. TS 36.300 explicitly discloses that the handover flows are generally the same regardless of whether the handover is an Inter-RAT handover or not. Ex. 1223 at 77 ("Similar handover procedure should apply for both Inter RAT Handover and intra-LTE Handover[.]").[3] Accordingly, a POSITA would have been motivated to design Chitrapu's smart handover to be applicable to Intra-RAT and Inter-RAT handover. Ex. 1005, ¶133.

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[3] While Chitrapu discloses 3G networks and the use of nodeBs (Ex. 1005, ¶132), Mr. Proctor explains how a POSITA at the time of the '888 patent would have looked to the most current version of the 3GPP standards and understood that the generic 3G handover in Chitrapu could be implemented in Intra-LTE or Inter-RAT systems in then-current 4G systems, which at that time were in widespread use. Ex. 1005, ¶¶65, 100-101, 116, 130-134.

Second, a POSITA would have known about the practical use of multiple, layered networks that require the use of inter-RAT handover. As described above, in the United States at the time of the '888 Patent, carriers had multiple networks with different RATs (e.g., 2G, 3G, and 4G networks). Ex. 1005, ¶134. A POSITA would have understood that—to ensure calls are not dropped or that the highest level of service is used (e.g., 4G) for UEs capable of operating on these networks (e.g., UEs with 3G and 4G capability)—the UEs would have been handed over between the different wireless networks using the well-known, standardized Inter-RAT procedure from 3GPP. Ex. 1005, ¶134. This would have further motivated a POSITA to look to the inter-RAT handover procedure.

Thus, a POSITA reading Chitrapu in light of TS 36.300 would at least find it obvious that Chitrapu's disclosure of "smart" handover would have included inter-RAT handover between different types of wireless networks. Ex. 1005, ¶135.

[9.a] receiving a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network;

Chitrapu in combination with TS 36.300 renders obvious this claim limitation. The claim limitation consists of two parts: (i) receiving a handoff request from the second wireless network, and (ii) the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is not

currently covered by the first wireless network but is capable of being covered by the first wireless network. Ex. 1005, ¶136.

(1) "receiving a handoff request from the second wireless network"

Chitrapu in combination with TS 36.300 renders obvious a first wireless network (target) receiving a handover from a second wireless network (source). Ex. 1005, ¶137.

Figure 11 from Chitrapu is a flow chart for smart handover.

Ex. 1003, Fig. 11 (annotated); Ex. 1005, ¶138

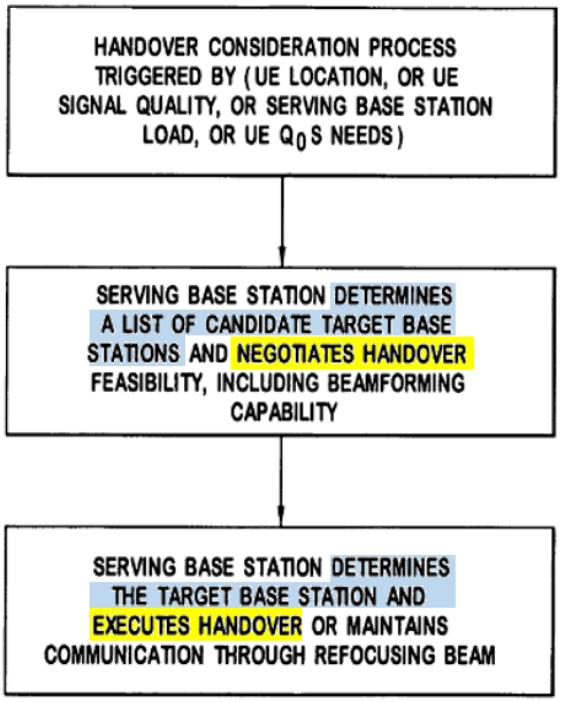
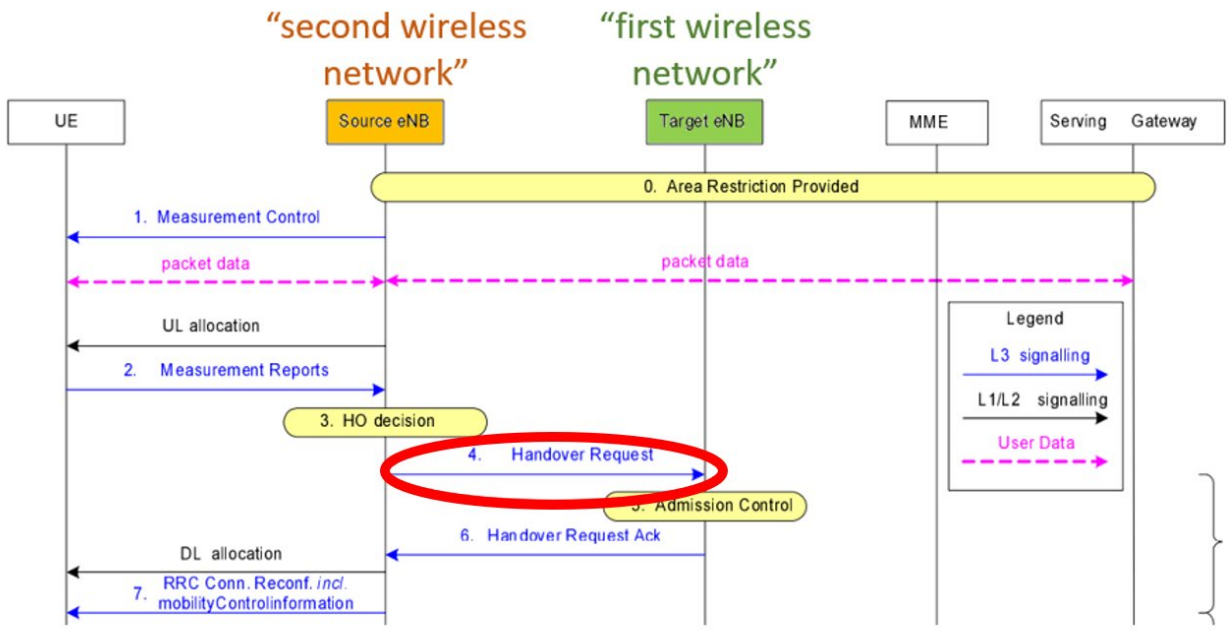


FIG. 11

In Figure 11, the "serving" base station (in a "second wireless network" of the claim limitation) (i) determines the candidate target base stations (step 2), (ii) negotiates handover between candidate base stations (step 2), (iii) determines the target base station (step 3), and (iv) executes the handover (step 3). Ex 1003, ¶[0109]; Ex. 1005, ¶139. A POSITA would have understood that "negotiating" and "executing" a handover means the base stations exchange a series of defined messages. Ex. 1005, ¶140.

Chitrapu discloses its systems are constructed in accordance with "specifications of the 3rd Generation Partnership Program (3GPP)," and thus a POSITA would have been motivated to consider the handover messages defined in the 3GPP standards. Ex. 1003, ¶[0007]; Ex. 1005, ¶140. TS 36.300 discloses the relevant handover messages, including specifically the "handover request" message of the claim limitation. In Figure 10.1.2.1.1-1, TS 36.300 discloses an explicit handover request message (message 4, in red circle) from the source base station to the target base. Ex. 1223 at 63. As discussed above in the "Motivation to Combine" section, a POSITA would have considered it obvious to use the handover request message to implement Chitrapu's teaching of executing the handover following the determination of "beamforming capability" and identification of the target base station. Ex. 1005, ¶¶120-123; *see* Ex. 1003, Fig. 11.

Ex. 1223, Fig. 10.1.2.1.1-1 (partial and annotated); Ex. 1005, ¶141



While Figure 10.1.2.1.1-1 is a call flow for intra-LTE handover, TS 36.300 discloses that a similar handover request message is sent in Inter-RAT handover, Ex. 1223 at 76-77; Ex. 1005, ¶142. Specifically, Section 10.2.2 directed to Inter-RAT handover describes how the "handover procedure should apply for both Inter RAT Handover and intra-LTE Handover." Ex. 1223 at 77. As a result, a POSITA would have understood that the handover request message from Figure 10.1.2.1.1-1 would also be transmitted during Inter-RAT handover. Ex. 1005, ¶¶141-142.

Thus, reading Chitrapu in conjunction with TS 36.300, it would have been obvious that Chitrapu's smart handover could include a receiving a handoff request from the second wireless network. Ex. 1005, ¶143.

(2) "the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network"

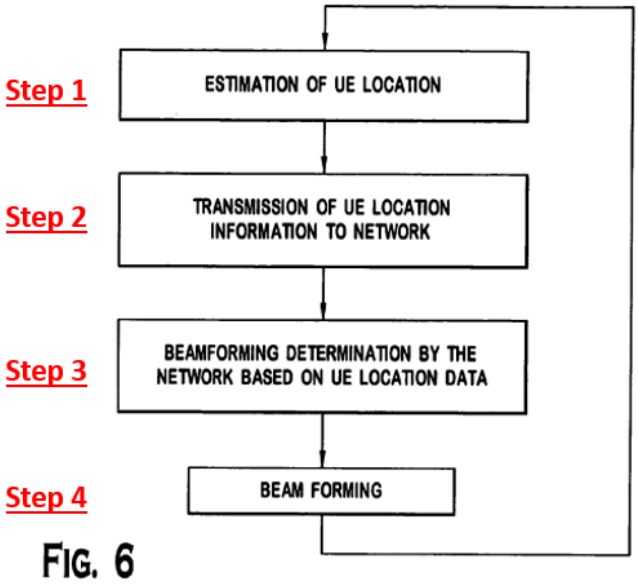
Chitrapu in combination with TS 36.300 renders obvious that the source (second) base station sends the handover request based in part on a determination that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network. Ex. 1005, ¶144.

First, Chitrapu discloses that the *source* base station (second wireless network) determines the beam for the target base station during a smart handover. Ex. 1003, ¶[0109]. Chitrapu states "the *serving base station determines* which base stations are to be involved and proceeds with the negotiation process *to select[] a preferred beam allocation pattern for all of the involved base stations*." Ex. 1003, ¶[0109]; Ex. 1005, ¶145. Mr. Proctor describes how this is disclosed in Figure 11 and paragraph [0109]. Ex. 1005, ¶¶145-146.

Second, to determine the preferred beams for the target base station to use, Chitrapu discloses that the source base station (i) acquires the UE locations, (ii) acquires the beamforming capabilities of the adjacent base stations, and (iii) determines how the beam for the target base station should be adjusted to cover the UE.

This process is shown in Figure 6:

Ex. 1003, Fig. 6 (annotated); Ex. 1005, ¶147.



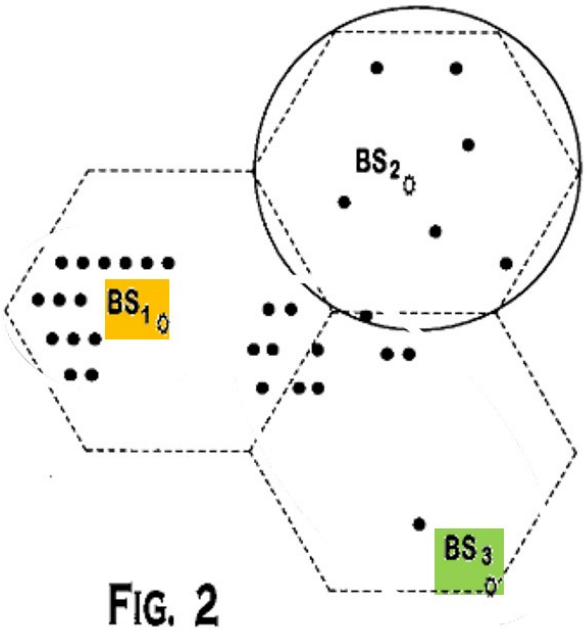
Chitrapu states: "The negotiation process, after being initiated by a triggering event, preferably entails [i] evaluating all of the UE location data for UEs communicating with the particular base stations and [ii] matching them with a set of beam patterns available to the particular base stations which provide a more even service distribution of the UEs with the same or lower signal to noise ratio (SNR)." Ex. 1003, ¶[0079]. In the description of Figure 6, Chitrapu provides that the "first step consists of determination of location and/or locations of the targeted UE," which "is preferably achieved by using well known techniques including . . . such as GPS based methods." Ex. 1003, ¶[0082]. In step two, the network is then made aware of the locations date for each UE by "an exchange of appropriately designed messages between the UE and the network." Ex. 1003, ¶[0082]. In step three, "the network

determines the characteristics of the beam forming in order to serve the targeted UE(s) in a manner deemed appropriate and/or optimal by the network." Ex. 1003, ¶[0083].

As a result, "[o]nce the negotiation process is completed, the base stations refocus their transmitted RF signals to provide the beams for the UEs which are determined during the negotiation process." Ex. 1003, ¶[0083]. In other words, the target base station will adjust its beams to cover UEs that were not previously covered but selected by the source base station to be covered after handover.

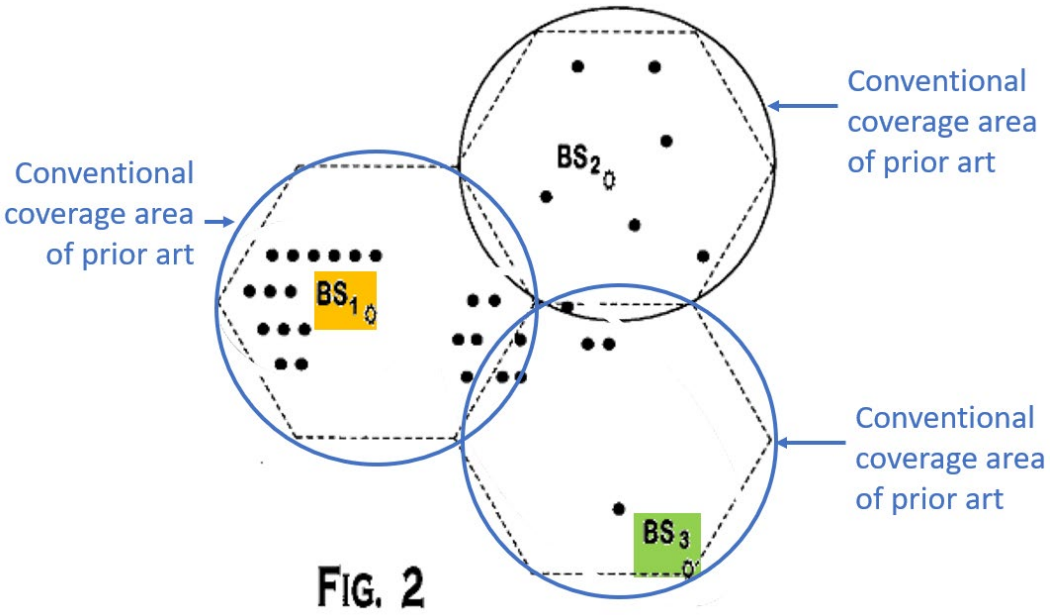
To illustrate this concept, Mr. Proctor first modifies Figure 2. Ex. 1005, ¶152. First, Mr. Proctor removed the dynamically shaped coverage area. This is shown below:

Ex. 1003, Fig. 2 (annotated to remove dynamically shaped coverage area); Ex. 1005, ¶152



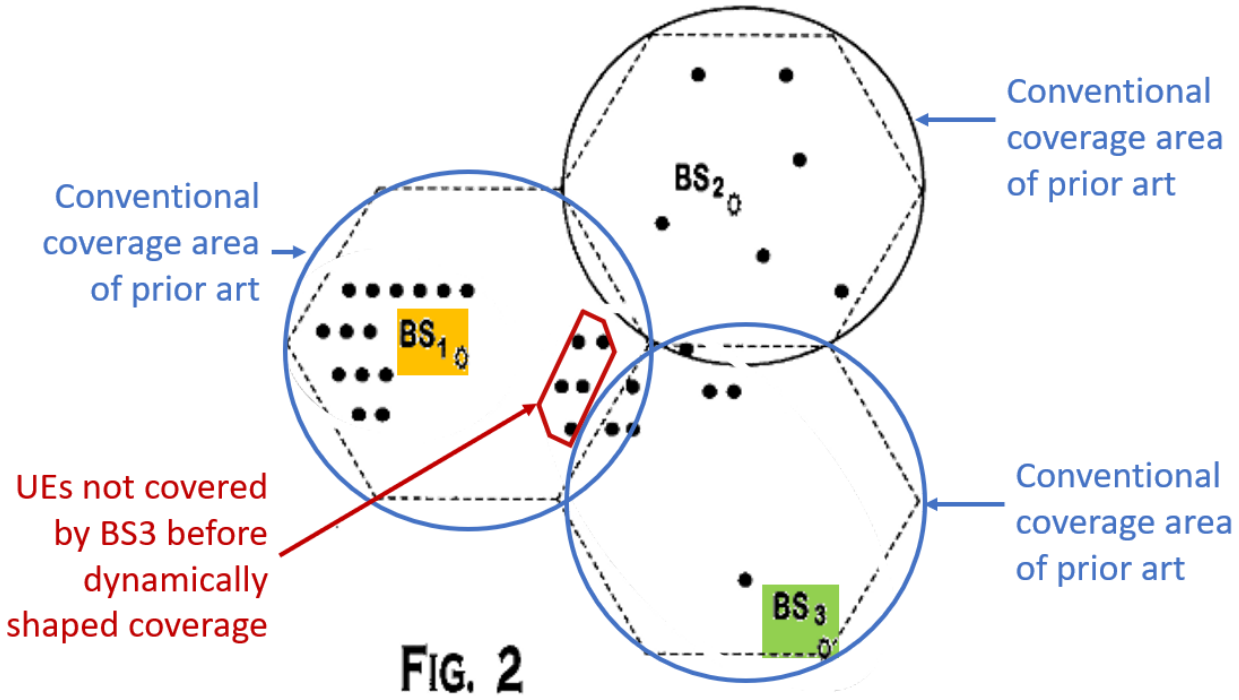
Next, Mr. Proctor illustrates the conventional coverage area of the prior art for BS1 and BS2. Ex. 1005, ¶153.

Ex. 1003, Fig. 2 (annotated); Ex. 1005, ¶153



Next, Mr. Proctor illustrates the UEs that not covered by BS3 before the dynamically shaped coverage process is deployed. Ex. 1005, ¶154.

Ex. 1003, Fig. 2 (annotated); Ex. 1005, ¶154

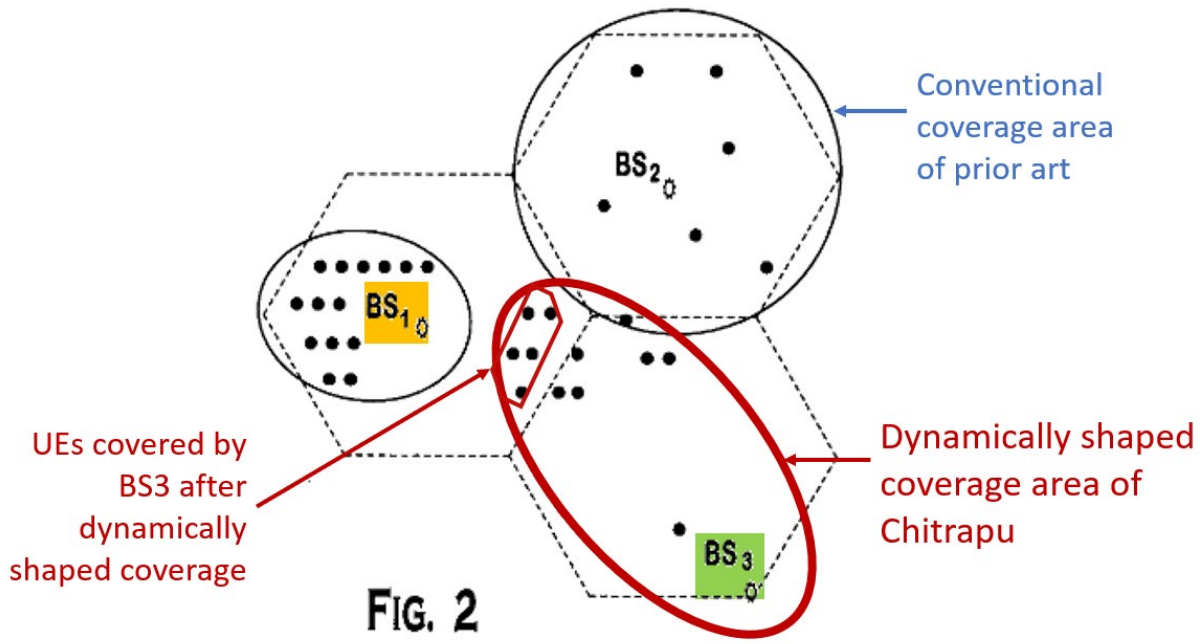


The UEs in the red box are camped on BS1 (source) and will be handed over to BS3 (target) by dynamically changing the coverage area for BS3 using the smart handover described above. Ex. 1005, ¶155; Ex. 1003, ¶[0105] ("Dynamic beam forming can also be advantageously employed in implementing handover of on-going communications.").

Given that the source base station (BS1) makes the beamforming determination by acquiring UE location information and beamforming capabilities of BS3, BS1 determines that those UEs are not currently covered by BS3 but are capable of being covered by BS3. Ex. 1003, ¶[0109]; Ex. 1005, ¶156. In executing

the smart handover, BS1 and BS3 reshape the coverage area, which is shown in Figure 2:

Ex. 1003, Fig. 2 (annotated); Ex. 1005, ¶157



Finally, to the extent Patent Owner argues that Chitrapu does not disclose that the source base station is responsible for the handover determination, TS 36.300 explicitly discloses that the source base station makes the handover determination in 3GPP systems like Chitrapu. Ex. 1005, ¶158. TS 36.300 discloses "source access system decides about starting the preparation and provides the necessary information to the target system in the format required by the target system." Ex. 1223 at 77; Ex. 1005, ¶159. A POSITA would have understood in the context of Chitrapu's 3GPP-based systems, that the source base station would therefore be responsible for

determining the UE location information and "providing the necessary information to the target system." Ex. 1223 at 77; Ex. 1005, ¶160. TS 36.300 likewise discloses that the "actual handover execution is decided in the source system." Ex. 1223 at 77. Thus, TS 36.300 informs a POSITA that the source base station is responsible for handover determinations, including that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network. Ex. 1223 at 77; Ex. 1005, ¶161.

Following the determination of "beamforming capability," including coverage of the wireless device, Chitrapu teaches that the "serving base station ... executes handover." Ex. 1003, Fig. 11. As discussed in the previous subsection and the "Motivation to Combine" section, a POSITA would have considered it obvious that the execution of handover is implemented using the handover messages defined in TS 36.300, including the standard's handover request message. In the proposed combination, and as discussed in further detail below, the handover request message includes information about the determined coverage, and therefore is "receiv[ed] ... based ... on a determination by the second wireless network that the wireless device is not currently covered by the first wireless network but is capable of being covered by the first wireless network." Ex. 1005, ¶¶161-162.

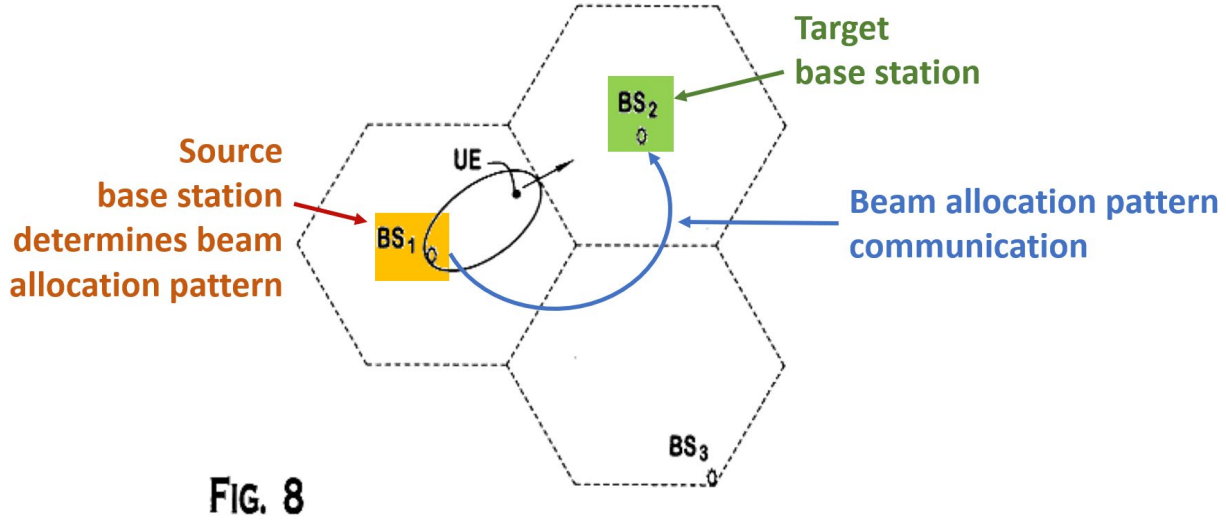
[9.b] based, at least in part, on the handoff request, adapting one or more beams of an antenna array to facilitate coverage of the wireless device by the first wireless network; and.

Chitrapu in combination with TS 36.300 renders obvious this claim limitation. Ex. 1005, ¶163. As with element 9.a, Figure 2 of Chitrapu and the description of smart handover in paragraphs [0105]-[0109] show the serving base station is responsible for the handover process. TS 36.300 shows the information about the handover process is sent in the handoff request. Ex. 1005, ¶164.

As stated above with respect to element 9.a, paragraph [0109] of Chitrapu discloses that the serving base station determines how the beams of the target base station (in the first wireless network) should be adapted. *See also* Ex. 1003, ¶¶[0105]-[0109]; Ex. 1005, ¶165. For example, Chitrapu states "the serving base station determines which base stations are to be involved *and proceeds with the negotiation process to select[] a preferred beam allocation pattern* for all of the involved base stations." Ex. 1003, ¶[0109].

A POSITA would have understood that these selected beam allocation patterns must be communicated to the target base station (or at least it would be obvious to do so) so that BS2 can implement the pattern. Ex. 1005, ¶166. This process is shown in the annotated version of Figure 8 below:

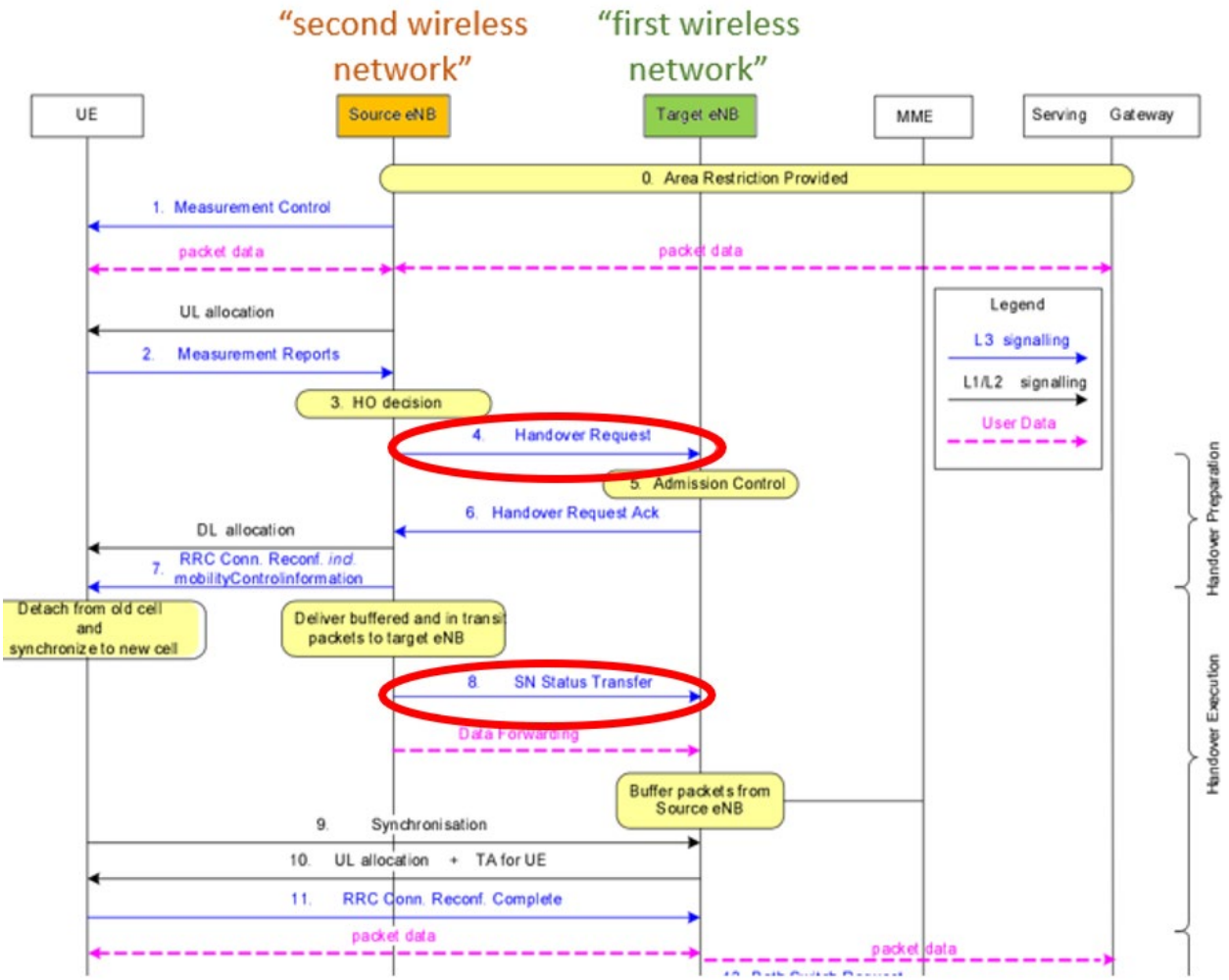
Ex. 1003, Fig. 8 (annotated); Ex. 1005, ¶166



To communicate the pattern, a POSITA would have understood that messages would be exchanged between the source and target base station, and a POSITA would have understood that 3GPP defined standardized handover messaging for exchanging such information. Ex. 1005, ¶¶167-168. In addition, a POSITA would have understood that the handover process typically begins with a handover request message from the source base station to the target base station. Ex. 1005, ¶168. A POSITA would have also considered it obvious to include information necessary to complete the handover in the handover request to limit the number of messages required to complete the handover, and thus it would have been obvious to a POSITA to include the beam allocation in the handover request. Ex. 1005, ¶168.

For example, in light of the messaging disclosed in TS 36.300, it would have been obvious to a POSITA to transmit the beam allocation pattern in the Handover Request message. Ex. 1005, ¶169. The Handover Preparation and Execution phases are shown below:

Ex. 1223 at 63 (partial); Ex. 1005, ¶170



As shown in this Figure, there are only two messages (circled in red above) transmitted from the source base station to the target base station (*e.g.*, messages 4

and 8) during handover, and thus it would have been obvious to a POSITA would have known that the beam allocation pattern selected by the source network for the target network should be included in one of those messages. Ex. 1005, ¶171. The first message (message 4) is the claimed Handover Request message circled in red and is the most logical message to use for this transmission. In describing this message, the TS 36.300 specification discloses the "source eNB issues a HANDOVER REQUEST message to the target eNB *passing necessary information to prepare the HO at the target side*." Ex. 1223 at 64. A POSITA would have understood that necessary information to prepare for HO at the target side would have included the beam allocation pattern the source base station selected, since these beam allocation patterns are taught in Chitrapu as necessary for the handover. Ex. 1005, ¶173; Ex. 1003, ¶¶[0108]-[0110]. As noted by Mr. Proctor, this conclusion is further buttressed by the fact that the beam allocation patterns would have been needed by the base station and UE in the steps after the handover message, because Chitrapu teaches that, in order to perform the handover, the "new server base station will first implement the selected beams determined for it" in order to "acquire the UE communication," thereby requiring that the new base station receive its beam allocation pattern. Ex. 1005, ¶173. Thus, it would have been obvious to a POSITA to transmit the beam confirmation to a target base station as part of the handover request, and it would have been obvious that the target base station would adapt one

or more beams based on the request to facilitate coverage of the wireless device by the first wireless network. Ex. 1005, ¶174.

Finally, Chitrapu discloses that the base station consists of an antenna array, and a POSITA would have known that beam forming requires adapting the beam using the antenna array. Ex. 1003, ¶[0049], Fig. 4 ("Base Stations Refocus the Radio Beams Using Antenna Arrays"); Ex. 1005, ¶175. As Chitrapu explains it, a "beam former" is "operatively associated with the RF module of each base station to form a set of desired beams within a range of beams ***which the base station's antenna array system is capable of producing***." Ex. 1003, ¶[0049]. In other words, in order to adapt a base station to a specific beam forming pattern, Chitrapu teaches that a "beam former" adapts the beams of an antenna array. Ex. 1005, ¶175. Thus, the adaptation of the beams is based off the handoff request that contains the beam allocation pattern.

Thus, element 9.b is rendered obvious by the prior art.

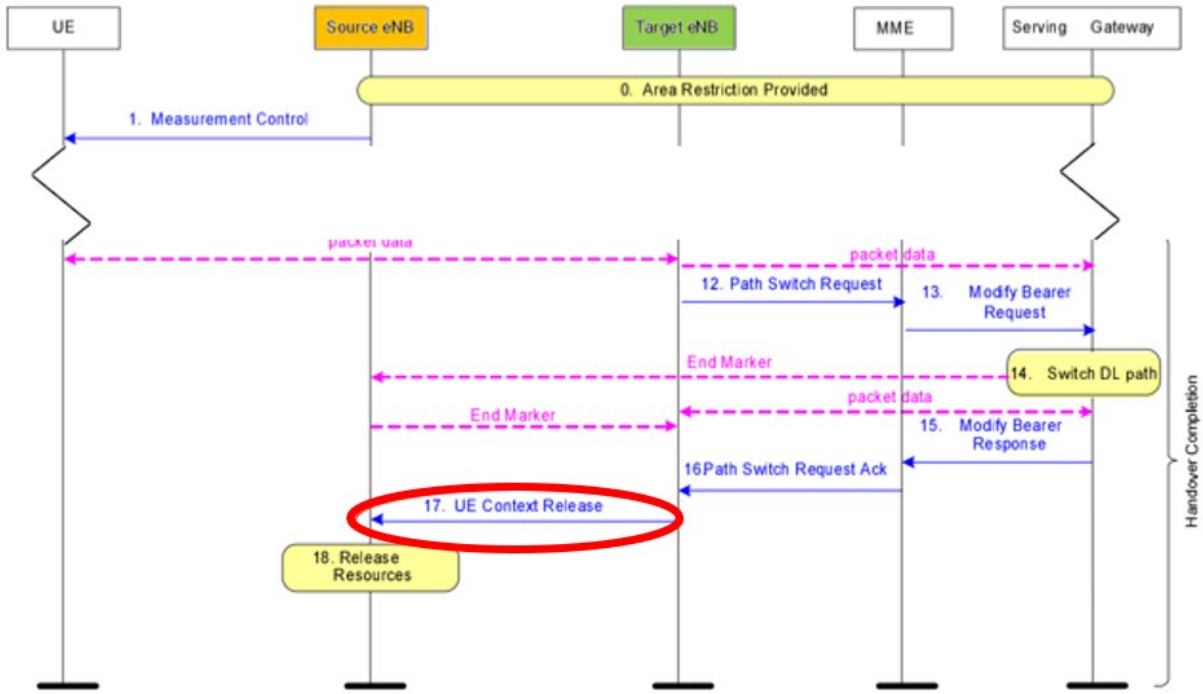
[9.c] transmitting a confirmation from the first wireless network to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.

Chitrapu in view of TS 36.300 renders obvious transmitting a handover confirmation from the first wireless network to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.

As described earlier, it would have been obvious to a POSITA to consider the standardized handover messaging in TS 36.300 when implementing the system in Chitrapu. Ex. 1005, ¶178.

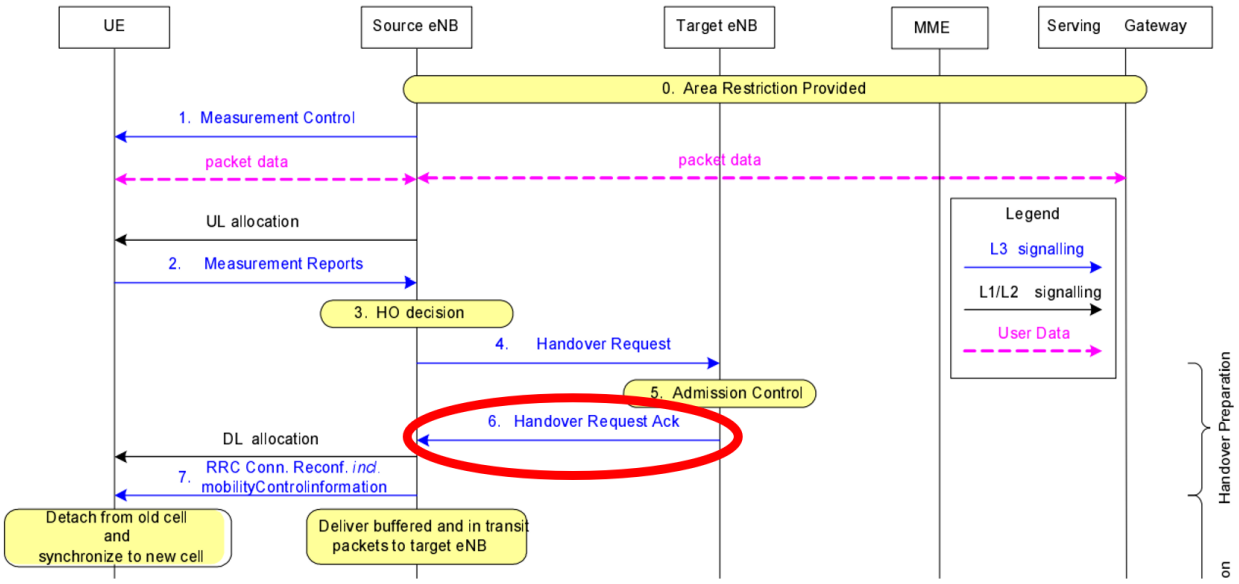
TS 36.300 discloses a confirmation message sent from the target network (first network) to the source network (second network) in the form of a "UE Context Release." Ex. 1005, ¶179.This message is sent as the final message of the "handover completion" phase. Ex. 1223 at 63. This is illustrated as message 17 ("UE Context message") of Figure 10.1.2.1.1-1 below. Ex. 1223 at 63; Ex. 1005, ¶179.

Ex. 1223, Fig. 10.1.2.1.1-1 (annotated and partial); Ex. 1005, ¶179



The TS 36.300 specification states, "[b]y sending the UE CONTEXT RELEASE message, the target eNB *informs success of HO* (handover) to source eNB." Ex. 1223 at 64 (emphasis added). Thus, the UE Context Release message is a handover confirmation message as required by the claim limitation. Ex. 1005, ¶181. Should Patent Owner interpret this claim such that the claimed handover is instead just an acknowledgment that the message was accepted, and not that the handover was necessarily completed, then the "Handover Request Ack" in Figure 10.1.2.2.1-1 labeled as message 6 below also supports this limitation, and a Handover Request Acknowledgement is a handover confirmation under this interpretation. Ex. 1005, ¶¶182-183.

Ex. 1223, Fig. 10.1.2.1.1-1 (annotated and partial); Ex. 1005, ¶182



2. Dependent claim 10

[10] A method according to claim 9, wherein the receiving the handoff request comprises receiving the handoff request via a wireless or a wired communication link that communicatively couples the first wireless network to the second wireless network.

Chitrapu and TS 36.300 renders obvious this limitation. In particular, Chitrapu and TS 36.300 discloses the network interface that connects the wireless networks.

Chitrapu explains that a "network interface interconnects the base stations." Ex. 1003, ¶[0036]. Chitrapu further discloses that the "base station/network interface may be by wireline, wireless or any other type of connection." Ex. 1003, ¶[0084]. A POSITA would have understood that a network interface that interconnects the base stations means that the base stations are communicatively coupled. Ex. 1005, ¶186.

Similarly, TS 36.300 describes base stations that are communicatively coupled. Ex. 1223 at 19. As shown in Figure 4-1 below, the X2 interface (red line) commutatively couples the base stations and the S1 interface communicatively couples the base stations through the core network. Ex. 1223 at 19; *see also* Ex. 1223, § 10.1.2.1 (titled "Handover" and disclosing "source eNB passes all necessary information to the target eNB").

Ex. 1223, Fig. 4-1; Ex. 1005, ¶187

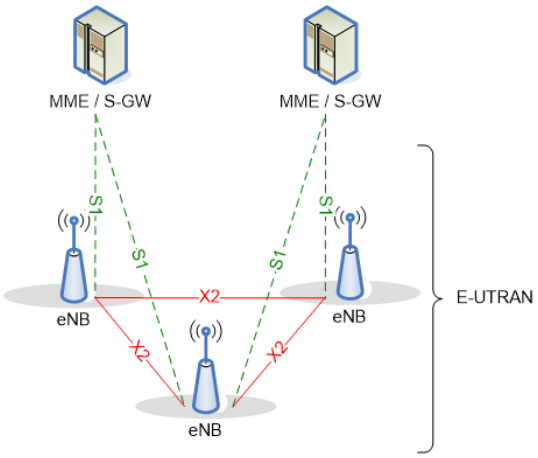


Figure 4-1: Overall Architecture

TS 36.300 likewise shows that base stations involving different RATs are communicatively coupled in the same way. Ex. 1223 at 77-78; Ex. 1005, ¶188. Section 10.2.2, which deals with inter-RAT handover, discloses that the "source access system decides about starting the preparation and provides the necessary information to the target system in the format required by the target system." Ex. 1223 at 77-78. A POSITA would have understood that in order for one system to provide information to another system, the two wireless networks must be communicatively coupled. Ex. 1005, ¶189.

3. Dependent claim 12

[12] A method according to claim 9, wherein the adapting one or more beams comprises adapting one or more beams based, at least in part, on one of a predetermined network load placed on the first wireless network due to the handoff of the wireless device or an effect of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network.

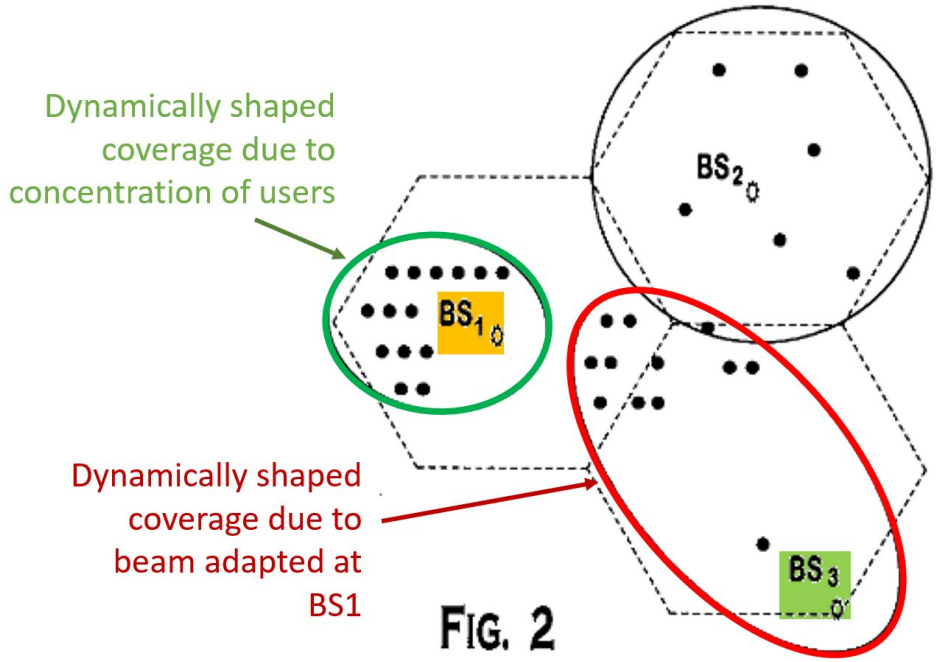
Chitrapu discloses this claim limitation. Chitrapu discloses adapting one or more beams based, at least in part, on one of (i) a predetermined network load placed on the first wireless network due to the handoff of the wireless device, or (ii) an effect of adapting one or more beams on other wireless devices currently communicatively coupled to the first network. Ex. 1005, ¶191.

Specifically, adaption based on the claimed limitations are expressly described in Chitrapu as part of the "smart handover" triggering event. Ex. 1003, ¶[0108] ("The first step is to trigger the smart handover process through the occurrence of a triggering event."). The triggering event is based on a predetermined threshold. *E.g.*, Ex. 1003, ¶[0108] ("The triggering event preferably includes thresholds relating to . . . [e.g.,] base station load . . . ."); Ex. 1005, ¶192.

For example, Chitrapu discloses "a significantly high concentration of users in a small area can also be used as a triggering event." Ex. 1003, ¶¶[0078], [0061] ("FIG. 2 illustrates the dynamic use of shaped transmission beams to address a specific concentration of users."); *see also* Ex. 1003, Fig. 10, ¶[0107] ("[I]n FIG. 10, a high concentration of users proximate base station BS2 has resulted in the 'smart'

handover determination."); Ex. 1005, ¶193. Figure 2 of Chitrapu (annotated below) illustrates "the dynamic use of shaped transmission beams to address a specific concentration of users." Ex. 1003, ¶[0061].

Ex. 1003, Fig. 2 (annotated); Ex. 1005, ¶193



Chitrapu discloses "FIG. 2 illustrates a concentration of users in the base station BS1 region and the region between base station BS1 and base station BS3." Ex. 1003, ¶[0075]. Chitrapu then discloses "Upon determining the high concentration of users *in these regions* [e.g., the triggering event is based on a determination about the concentration of users in both the respective base stations], the antenna arrays at base station BS1 and base station BS3 are used to transmit a selectively shaped and directed beam to provide the needed radio resources to the

user concentrations." Ex. 1003, ¶[0075]. In conjunction with the corresponding smart handover disclosure described above in claim 9, Chitrapu discloses adapting one or more beams based, at least in part, on a predetermined network load placed on the first wireless network due to the handoff of the wireless device. Ex. 1005, ¶196.

4. Independent claim 20

[20.p] A system for a wireless device handoff between a first wireless network and a second wireless network, the system comprising:

For at least the reasons discussed above regarding claim 9.p, Chitrapu and TS 36.300 renders obvious this limitation. As noted in that section, Chitrapu is not limited to any type of handover and inter-RAT handover was a well-known procedure in the art.

[20.a] an antenna array configured to generate one or more adaptable beams to modify a coverage area for the first wireless network; and

For at least the reasons discussed above regarding claim limitations 9.a and 9.b, Chitrapu and TS 36.300 renders obvious this limitation. In particular, Chitrapu discloses that the base station consists of an antenna array which are used to refocus the radio beams. Ex. 1003, ¶[0049], Fig. 4 ("Base Stations Refocus the Radio Beams Using Antenna Arrays"). Likewise, a POSITA would have known that beam forming requires adapting the beam using the antenna array. Ex. 1005, ¶201.

[20.b] an adaption manager having logic, the logic configured to:

Chitrapu renders obvious this claim limitation. Chitrapu discloses an adaption manager configured to perform the functions listed in elements 20.b. In particular, Chitrapu discloses a "beam former," a "geolocation processor" *See, e.g.*, Ex. 1003, ¶[0041]. Chitrapu discloses how the "beam former controls the RF module to transmit or receive communication data for a selected UE in a shaped beam that encompasses an estimated location of the selected UE where geolocation data which corresponds to the estimated location of the selected UE is processed by the geolocation processor." Ex. 1003, ¶[0022]. A POSITA would have understood these components to be an adaption manager having logic. Ex. 1005, ¶203.

[20.c] receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network

For at least the reasons discussed above regarding claim 9.a, Chitrapu and TS 36.300 renders obvious this limitation. As explained in that section, the handover request message was a well-known message in the art and was defined by TS 36.300. Ex. 1223, Fig. 10.1.2.1.1-1. Both Chitrapu and TS 36.300 disclose that the source network (the "second wireless network") is responsible for the handover determination. Ex. 1003, ¶[0109] ("the *serving base station determines* which base stations are to be involved and proceeds with the negotiation process *to select[] a*

preferred beam allocation pattern for all of the involved base stations."); Ex. 1223 at 77; Ex. 1005, ¶206.

[20.d] cause a beam from among the one or more adaptable beams to be adapted in order to enable the wireless device to be covered by the first wireless network, and

For at least the reasons discussed above regarding claim limitations 9.a and 9.b, Chitrapu and TS 36.300 renders obvious this limitation. As disclosed in Chitrapu, there is a "negotiation process," that occurs after a triggering event for smart handover. Ex. 1003, ¶[0079]. In Figure 6, Chitrapu describes using the UE location data and determining "the characteristics of the beam forming in order to serve the targeted UE(s) in a manner deemed appropriate and/or optimal by the network." Ex. 1003, ¶[0083]. The last step of Figure 6 then shows how "[o]nce the negotiation process is completed, the base stations refocus their transmitted RF signals to provide the beams for the UEs which are determined during the negotiation process." Ex. 1003, ¶[0083].

[20.e] transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.

For at least the reasons discussed above regarding claim 9.c, Chitrapu and TS 36.300 renders obvious this limitation. It would have been obvious to a POSITA to consider the standardized handover messaging in TS 36.300 when implementing the system in Chitrapu. Ex. 1005, ¶212. TS 36.300 discloses a confirmation message

sent from the target network (first network) to the source network (second network) in the form of a "UE Context Release," in which the "target eNB *informs success of HO* (handover) to source eNB." Ex. 1223 at 64 (emphasis added).

5. Dependent claim 21

[21] A system according to claim 20, wherein to receive the handoff request comprises to receive the handoff request via a wireless or a wired communication link that communicatively couples the first wireless network to the second wireless network.

For at least the reasons discussed above regarding claim 10, Chitrapu and TS 36.300 renders obvious this limitation. Chitrapu explains that a "network interface interconnects the base stations." Ex. 1003, ¶[0036]. Chitrapu further discloses that the "base station/network interface may be by wireline, wireless or any other type of connection." *Id.* at ¶[0084]. A POSITA would have understood that a network interface that interconnects the base stations means that the base stations are communicatively coupled. Ex. 1005, ¶215. Similarly, TS 36.300 describes base stations that are communicatively coupled. Ex. 1223 at 19. Section 10.2.2, which deals with inter-RAT handover, discloses that the "source access system decides about starting the preparation and provides the necessary information to the target system in the format required by the target system." Ex. 1223 at 19. A POSITA would have understood that in order for one system to provide information to another system, the two wireless networks must be communicatively coupled. Ex. 1005, ¶216.

6. Dependent claim 23

[23] A system according to claim 20, wherein to cause the beam to be adapted comprises to cause a beam to be adapted based, at least in part, on one of a network load placed on the first wireless network due to the handoff of the wireless device or an impact of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network.

For at least the reasons discussed above regarding claim 12, Chitrapu and TS 36.300 renders obvious this limitation. Specifically, Chitrapu describes "smart handover" triggering events. Ex. 1003, ¶[0108] ("The first step is to trigger the smart handover process through the occurrence of a triggering event."). The triggering event is based on a predetermined threshold. *E.g.*, *id.* ("The triggering event preferably includes thresholds relating to . . . [e.g.,] base station load . . . ."); Ex. 1005, ¶219. This load could be due to "a significantly high concentration of users in a small area can also be used as a triggering event." Ex. 1003, ¶¶[0078], [0061], Fig. 2.

X. THIS PETITION CONTAINS NEW ARGUMENTS AND PRIOR ART NOT PREVIOUSLY PRESENTED TO THE OFFICE

The prior art cited in the instant petition was not cited and is different from the prior art considered by Examiner during original prosecution of the '888 Patent.

Accordingly, this petition is not redundant to the original examination for purposes of § 325(d).

XI. *FINTIV* FACTORS IN FAVOR OF INSTITUTION

The Board balances six factors in considering discretionary denial under 35 U.S.C. § 314(a) when parallel litigation exists. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). Here, the factors ("*Fintiv* factors") favor institution.

Factor 1—potential stay of the district court litigation—is neutral because no party has requested a stay. *VMWare, Inc. v. Intellectual Ventures I LLC*, IPR2020-00470, Paper 13 (P.T.A.B. Aug. 18, 2020), at 17 (finding in the absence of a stay motion that this factor "does not weigh for or against discretionary denial").

Factor 2—district court trial date and the Board's statutory deadline— should be considered neutral. The earliest estimated trial date for the district court litigation is far in the future as jury selection in the AT&T, T-Mobile, and Verizon litigation is not set to begin until at least September 23, 2024, and the trial date in the Samsung litigation is not set to begin until at least May 5, 2025. *See* Ex. 1012 at 1. Because much can change in nine months, the current trial date does not support denial. *See Dish Network v. Broadband iTV*, IPR2020-01280, Paper 17 at 16 (PTAB Feb. 4, 2021) ("We cannot ignore the fact that the currently scheduled trial date is more than nine months away and much can change during this time").

Factor 3—investment in the district court proceedings—weighs heavily against discretionary denial. The associated district court case is still in the very early

stages of litigation: discovery is still in the preliminary stages, the Defendants filed their invalidity contentions in May 2023, and Claim Construction is not scheduled until April 30, 2024. Ex. 1012 at 3. Moreover, a claim construction order will not issue prior to the PTAB's projected institution decision date. Accordingly, the district court will not invest significant resources or issue substantive orders related to the challenged patent prior to the issuance of an institution decision. *See Fintiv*, IPR2020-00019, Paper 11 at 9-12. Regardless, Petitioners diligently prepared this Petition and filed well in advance of the statutory deadline, which weighs against denying institution.

Factor 4—overlap in the parallel proceedings—favors institution. Instituting trial will allow issues to be narrowed in the district court because, if instituted, Petitioners stipulate that they will not pursue invalidity against the asserted claims in the district court using the specific combination of prior art references set forth in the grounds presented in this Petition for purposes of establishing obviousness. *See Sand Revolution II LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 11-12 (PTAB June 16, 2020) (holding a similar stipulation weighs against discretionary denial). Given the lack of overlap between the proceedings, this factor weighs against the Board exercising discretion to deny.

Factor 5—overlapping parties—is neutral as it is "far from an unusual circumstance that a petitioner in *inter partes* review and a defendant in a parallel

district court proceeding are the same." *Sand*, No. IPR2019-01393, Paper 24, at 12-13.

Factor 6—other considerations—weighs against discretionary denial. As explained, the merits of the Petition are strong, and the Challenged Claims are invalid. For example, none of the grounds asserted herein were previously considered by either the Office or the district courts. *Cf. Comcast Cable Commn's, LLC v. Rovi Guides, Inc*., IPR2019-00231, Paper 14 at 11 (PTAB May 20, 2019) (obviousness challenges not "previously considered by the Office or any court" weigh in favor of not denying institution). Moreover, the '888 Patent is currently asserted in a district court case. Institution of this IPR provides the opportunity for narrowing and simplifying the litigations for the district court.

Compelling Merits – Finally, discretionary denial is not warranted because this petition presents compelling evidence of unpatentability. Ex. 1013 at 2. Chitrapu in view of TS 36.300 presents compelling invalidity arguments with clear disclosures of the allegedly novel aspects of the challenged claims.

Accordingly, the Board should decline to exercise its discretion under *Fintiv* and institute trial.

XII. CONCLUSION

For the reasons provided above, *inter partes* review of claims 9, 10, 12, 20, 21 and 23 of U.S. Patent No. 9,094,888 is requested.

Dated: November 22, 2023

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned Petition for *Inter Partes* Review of U.S. Patent No. 9,094,888 specified in 37 C.F.R. § 42.24 have 10,489 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24(a)(1)(i). This word count was prepared using Microsoft Word 2010.

Dated: November 22, 2023

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CERTIFICATION OF SERVICE (37 C.F.R. §§ 42.6(e), 42.105(a))

The undersigned hereby certifies that true and correct copies of the above-captioned **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,094,888**, all associated exhibits, and Petitioner's Power of Attorney were served in their entireties on November 22, 2023, upon the following parties via UPS® Express:

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