

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

GENERAL ACCESS SOLUTIONS, LTD.,

Plaintiff,

v.

T-MOBILE USA, INC.,

Defendant,

ERICSSON INC.,

Intervenor-Defendant,

NOKIA OF AMERICA, INC.,

Intervenor-Defendant.

C.A. No. 2:23-158-JRG

Corrected Expert Report of Dr. Vijay K. Madiseti on Infringement and
Technical Benefits of the Asserted Patents

Volume II – U.S. Patent Nos. 6,947,477 and 7,099,383



Dr. Vijay K. Madiseti

66. For the '477 Patent, one of ordinary skill in the art at the time of the patent would have had at least a bachelor's degree in computer science, electrical or computer engineering, or a related field, and at least two years of work or research experience in digital communications systems, such as wireless communications systems and networks, or equivalent, or a master's degree in electrical engineering, computer engineering, computer science, or a similar field. Relevant working experience would include experience with telecommunications and networking, radio-access networking, and/or service provisioning in wireless networks. More education can supplement practical experience and vice-versa.

B. Claim Construction

67. I understand that the parties have agreed on the construction of the following claim terms of the '477 Patent:

- i. "contention period" (claims 2, 14, 18) means "a period in which multiple stations may attempt to transmit to a receiving station"
- ii. "coupled to" (claims 1, 13) means "joined or connected to in any way"

68. I understand that the Court has not yet issued a claim construction decision in this matter. Once the Court issues its claim construction order, I reserve the right to amend or supplement my opinions consistent with the Court's claim construction decision.

69. I understand that all claim terms not expressly construed by the Court should be given their plain and ordinary meaning. My analysis in this report applies the plain and ordinary meaning of each claim term not construed by the Court.

C. Background of the '477 Patent

70. U.S. Patent No. 6, 947,477 (the "'477 Patent") is entitled "Apparatus and Method for Creating Signal and Profiles At A Receiving Station." It claims priority to a provisional application dated Jan 19, 2001, and issued on September 20, 2005. The '477 Accused Products include a profile creating apparatus for creating at least a first profile associated with transmission upon at least a first channel of at least a first burst-data signal transmitted in bursts to a receiving station.

71. The primary focus of the Asserted Claims of the '477 Patent is on improving how base stations process uplink signals from user equipment (UE). One of the major challenges in mobile networks is dealing with fluctuating channel conditions caused by factors such as interference, mobility, and environmental changes. One of the key aspects of the Asserted Claims of the '477 Patent is that it enables base stations to store and update a variety of signal *and* channel-related parameters in UE profiles. Through this innovation, the Asserted Claims of the '477 Patent enable a sophisticated system that enhances uplink signal processing through the creation and maintenance of real-time UE profiles. This adaptive approach helps the base station maintain higher data rates and more reliable connections, even under challenging network conditions. Thereby, the Asserted Claims of the '477 Patent offer significant benefits to mobile networks, particularly with regard to improving uplink throughput and capacity.

72. Adaptive modulation, as enabled by the Asserted Claims of the '477 Patent, is an important tool network operators can use to maximize uplink throughput and capacity. Modulation schemes in mobile networks play a crucial role in determining how efficiently data is transmitted,

are collectively representative of communication of the first burst data signal over the first channel to the receiving station.

4. Claim 1, Element 1(c)

210. The third element of Claim 1 (“Element 1(c)”) states: “a profile parameter storage device coupled to said profile parameter determiner, said profile parameter storage device for storing values representative of the at least one signal-related parameter and the at least one channel-related parameter determined by said profile parameter determiner.”

211. In T-Mobile’s Accused ‘477 Base Stations, the determined signal-related and channel-related values are stored in a profile parameter storage device (coupled to the profile parameter determiner) within the receiving station, where they are used to improve transmission and reception between the base station and the UE.

212. T-Mobile’s Accused ‘447 Base Stations contain internal and external memory components, which comprise the claimed profile parameter storage device. For example, Nokia’s corporate representative confirmed that in the Loki System-on-Chip—which is one of the most widely used SoCs in the Nokia BBUs used in T-Mobile’s network—contains a specific memory component, which is called the “PHY SMEM.” That component stores UE related information that the processing components on the Loki SoC can access and use. *See* Kalyanasundaram Dep. 88:1-20:

Q. What is PHY SMEM?

A. My understanding is that it is PHY shared memory.

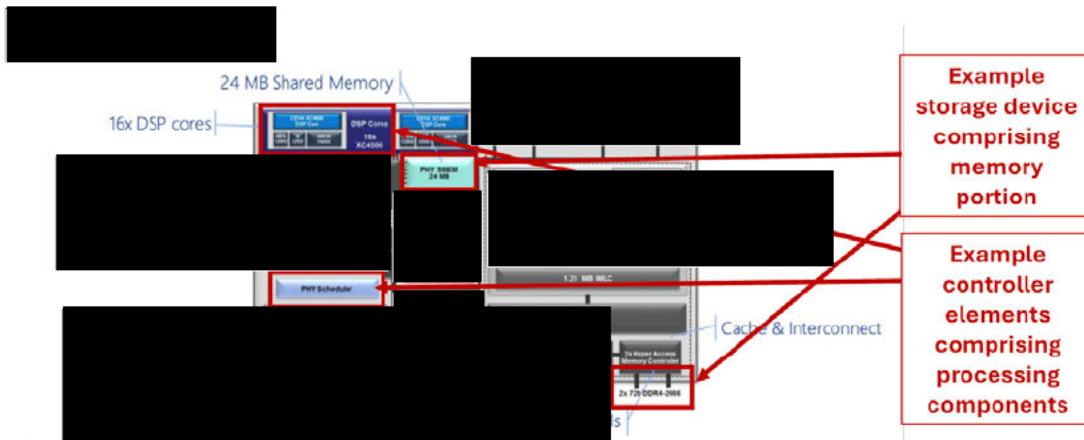
Q. And what function does the PHY shared memory perform in the Loki system-on-chip?

A. My understanding is that it stores information that can be accessed by the different components in the Loki system-on-chip.

Q. Is any of the information stored in the PHY memory information about the users?

A. The temporary memory storage for the different components to process the packets or process the events coming from the users.

213. The below schematic of the Loki System-on-Chip, which is the document Nokia’s corporate representative provided the above testimony above, confirms that it includes a memory component which is separate and distinct from the functioning component chips. Notably, the separate and distinct memory component is coupled to other processing components within the System-on-Chip. *See* Kalyanasundaram Ex. 4 at 35:



214. As discussed more extensively above, other documents and testimony confirm that all the Accused '477 Base Stations include separate and distinct memory components in which values representative of at least one signal-related parameter and at least one channel-related parameter are stored.⁴

215. As a non-limiting example, Nokia produced a document entitled, *5G U-Plane Software Architecture*, which describes the architecture of the components used in Nokia's baseband units, including components which receive and process uplink transmissions. According to the document, a UE database, which is the UE context, is created and stored for each UE that is in communication with the base station. *See* Kalyanasundaram Ex. 2 at 66 ("The UE database stores all UE related data for RRC connected UEs"); *see also* Kalyanasundaram Dep. 181:6-182:3 (confirming that the UE database or "UE DB" is the same as the "UE context."). Importantly, the document notes that the UE databases (or UE contexts) are stored in a "local memory" component. *See* Kalyanasundaram Ex. 2 at 66

4.4. Ue, Cell and CellGroup Data bases

There is one DB specialization per EO kind, except for UE DB that is only implemented in UL_SCH, DL_SCH and PDCCH_ALLOC EO kinds.

→ Each EO allocates its DBs in local memory on processing of the first cell Setup (not static since 5GC00998-K as explained in Memory allocation).

See also Kalyanasundaram Dep. 181:21-24 (testifying about the above document):

- Q. In Nokia's 5G base stations, the user database and the user context are the same thing, correct?
- A. That's my understanding.

⁴ To avoid unnecessary repetition, I incorporate the relevant sections here by reference. This incorporation by reference includes, but does not only include, the extensive discussion of the processing and memory components (and all the schematics) as well as the numerous references to the link adaptation, scheduling, and RRM functionalities. At trial, I reserve the right to use the evidence in those sections in my presenting evidence on this element.

368. As discussed above, T-Mobile's base stations determine and store both signal and channel related parameters. Those parameters are used to facilitate receive operations on subsequent bursts for all the reasons discussed above.

369. In addition, Claim 1 does not require that the values used to facilitate receive operations include values of both signal and channel related parameters. To the contrary, Claim 1 contemplates that the claimed apparatus may determine and store values related to numerous signal related and channel parameters. Claim 1 also requires that more than one of those values is "used to facilitate receive operations." Nothing in Claim 1 requires that all the stored/determined values are so used, or that the values used must span both signal and channel related parameters.

370. In addition, T-Mobile's accused base stations utilize values related to both signal and channel related parameters to facilitate receive operations. For example, values associated with signal and channel related parameters are used as inputs in T-Mobile's scheduling algorithm when scheduling subsequent uplink transmissions. Such inputs are used in various aspects of the scheduling algorithm, including allocation of frequency, modulation, coding, beams, etc. When receiving subsequent bursts from the subscriber, the base station utilizes the scheduling allocation to understand, for example, the modulation, coding, offsets, etc., used during that transmission. Thus, to the extent a value is used as an input in the scheduling process, it facilitates receive operations on subsequent bursts.

371. As another example, T-Mobile's base stations utilize values associated with a signal or channel related parameter to determine how best to decode a subsequent transmission from the same user. For example, values associated with the antenna equalization, covariance matrix, beamforming parameters, signal strength, SINR, GINR, or other signal or channel related parameters are used as inputs in the processing of subsequent bursts from the same user and thereby facilitate receive operations on subsequent bursts.

372. T-Mobile may also argue that its base stations utilize the claimed values only to facilitate receive operations on the current burst, and not on subsequent bursts. I disagree. As discussed extensively above, T-Mobile's base stations utilize values stored at the profile parameter storage device to facilitate receive operations on subsequent bursts. To the extent that T-Mobile's base stations may also utilize some of those values to facilitate receive operations on the "current burst" does not absolve them of their infringement.

2. Separate Storage of Signal and Channel Related Parameters

373. T-Mobile may assert that, in some cases, it stores values associated with signal and/or channel related parameters in separate memories and that its base stations therefore do not include the claimed profile parameter storage device. As discussed above in the context of the potential non-infringing alternatives, the claimed "profile parameter storage device," may include more than one component. Indeed, it is common for storage devices to comprise multiple memory components (e.g., hard disk drives that contain multiple NAND chips; SoCs with multiple memory portions, etc.). To the extent that T-Mobile's base stations store UE data on multiple memories, those memories are part of the same "device."

3. Storage Device Implemented As Part of the Determiner

374. T-Mobile may assert that, in some cases, its storage devices are located on the same "SoC" as the profile parameter determiner and that they therefore lack the arrangement described in