

SUPREME COURT OF NEW JERSEY

State of New Jersey v. Jule Hannah

State v. Hannah · No. A-44-24; 089819 · Decided April 16, 2026

SUMMARY

The Supreme Court of New Jersey held that testimony interpreting cell site location information involves technical and specialized knowledge under N.J.R.E. 702 and must be presented by a qualified expert witness. The Court affirmed the Appellate Division’s reversal of Jule Hannah’s convictions, concluding that the lay testimony about cell tower data and the State’s related arguments risked misleading the jury and constituted an improper circumvention of the standards governing expert testimony.

CASE DETAILS

COURT	Supreme Court of New Jersey
WRITING FOR THE COURT	Justice Pierre-Louis; Chief Justice Rabner; Justice Patterson; Justice Wainer Apter; Justice Fasciale; Justice Noriega; Justice Hoffman
JURISDICTION	Supreme Court of New Jersey
DECIDED	April 16, 2026
DOCKET	A-44-24; 089819
DISPOSITION	affirmed
PROCEDURAL POSTURE	The State petitioned for certification from the Appellate Division's reversal of defendant's convictions and remand for a new trial. The Supreme Court granted certification and affirmed the Appellate Division.
STANDARD OF REVIEW	Evidentiary rulings are reviewed for abuse of discretion and will not be disturbed unless they are so wide of the mark as to constitute a clear error in judgment. The Court also reviewed the adequacy of the limiting instructions in light of the prejudice from the evidentiary error.
PRECEDENTIAL VALUE	Published and precedential opinion of the Supreme Court of New Jersey
PARTIES	State of New Jersey v. Jule Hannah, a/k/a Jule L. Hanna

TOPICS

expert testimony

evidence

relevance

standard of review

appellate procedure

PRACTICE AREAS

Evidence

Criminal procedure

Appellate procedure

QUESTIONS PRESENTED

1. Whether testimony interpreting and mapping historical cell site location information may be presented by a lay witness under N.J.R.E. 701 or must be presented by a qualified expert under N.J.R.E. 702.
2. Whether the trial court's limiting instructions cured the prejudice and potential jury confusion caused by the detective's CSLI testimony and the State's related summation arguments.
3. Whether the admission of the CSLI testimony constituted reversible evidentiary error.

HOLDINGS

1. Historical cell site location information involves technical and specialized knowledge beyond the ken of the average juror and must be presented to the jury by a witness qualified as an expert under N.J.R.E. 702.
2. The trial court improperly admitted Detective Leyman's CSLI testimony as lay opinion testimony because the testimony interpreted and mapped tower data in a manner that permitted inferences about the location and movement of Hannah's phone.
3. The trial court's repeated limiting instructions did not cure the prejudice or confusion caused by the improperly admitted CSLI testimony and the State's contradictory summation arguments.
4. The CSLI conclusions presented through Detective Leyman were unsupported by adequate technical or objective data and would have constituted an impermissible net opinion even if offered by an expert.

KEY QUOTATIONS

“CSLI involves technical and specialized knowledge that must be presented to a jury by an expert witness at trial.” (at 3)

“The technical and specialized knowledge required to interpret CSLI is beyond the ken of the average juror. Therefore, CSLI evidence must be presented by an expert witness.” (at 45)

“The State cannot circumvent the standards to which expert testimony is held under N.J.R.E. 702 by presenting the testimony through a lay witness rather than an expert.” (at 47)

FACTUAL BACKGROUND

Lopez was found shot to death in a vehicle after it crashed in Bridgeton. The State relied in part on historical cell site location information from Hannah's phone, DNA on a cigar butt in Lopez's vehicle, surveillance evidence, and a recorded call to support its theory that Hannah was in Lopez's vehicle before the homicide. A detective testified as a lay witness about the cell towers to which phones connected and linked Hannah's phone activity to the victim's route, while the prosecutor argued that a phone had to be close to the tower it accessed.

PROCEDURAL HISTORY

A Cumberland County grand jury indicted Hannah for offenses arising from the murder of Miguel Lopez. After a jury convicted him of first-degree murder and weapons offenses, the Appellate Division reversed and remanded for a new trial, holding that historical cell site location information had improperly been admitted through lay testimony rather than qualified expert testimony. The Supreme Court affirmed.

DISPOSITION

affirmed

REMAND INSTRUCTIONS

The Court affirmed the Appellate Division's judgment reversing defendant's convictions and remanding for a new trial.

CASES CITED

- State v. Burney, 255 N.J. 1 (2023)
- State v. Allen, 254 N.J. 530, 543 (2023)
- State v. Garcia, 245 N.J. 412, 430 (2021)
- State v. Medina, 242 N.J. 397, 412 (2020)
- Hrymoc v. Ethicon, 254 N.J. 446, 474 (2023)
- State v. Jones, 425 N.J. Super. 258, 276 (App. Div. 2012)
- State v. Sanchez-Medina, 231 N.J. 452, 465 (2018)
- State v. Higgs, 253 N.J. 333, 358 (2023)
- State v. Buckley, 216 N.J. 249, 261 (2013)
- State v. Sanchez, 247 N.J. 450, 466 (2021)
- State v. McLean, 205 N.J. 438, 459 (2011)
- Brindley v. Firemen's Ins. Co., 35 N.J. Super. 1, 8 (App. Div. 1955)
- State v. Bealor, 187 N.J. 574, 586 (2006)
- State v. Johnson, 120 N.J. 263, 294 (1990)
- Hopkins v. Fox & Lazo Realtors, 132 N.J. 426, 450 (1993)
- Wyatt by Caldwell v. Wyatt, 217 N.J. Super. 580, 591-92 (App. Div. 1987)
- Taing v. Braisted, 456 N.J. Super. 465, 469-71 (Law Div. 2017)
- Morales-Hurtado v. Reinoso, 457 N.J. Super. 170, 193 (App. Div. 2018)
- Townsend v. Pierre, 221 N.J. 36, 53 (2015)
- Pomerantz Paper Corp. v. New Cmty. Corp., 207 N.J. 344, 372 (2011)
- State v. Earls, 214 N.J. 564, 576 (2013)
- State v. Lunsford, 226 N.J. 129, 133 (2016)
- United States v. Hill, 818 F.3d 289, 295-96, 299 (7th Cir. 2016)

- United States v. Natal, 849 F.3d 530, 536 (2d Cir. 2017)
- United States v. Graham, 796 F.3d 332, 365-66 (4th Cir. 2015), rev'd on other grounds, 824 F.3d 421 (4th Cir. 2016) (en banc)
- State v. Boothby, 951 N.W.2d 859, 876, 878 (Iowa 2020)
- State v. Sinnard, 543 P.3d 525, 544 (Kan. 2024)
- State v. Wyman, 107 A.3d 641, 647-48 (Me. 2015)
- State v. Payne, 104 A.3d 142, 154-55 (Md. 2014)
- State v. Blurton, 484 S.W.3d 758, 771 (Mo. 2016)
- State v. Patton, 419 S.W.3d 125, 130 (Mo. App. 2013)
- Burnside v. State, 352 P.3d 627, 636 (Nev. 2015)
- Torrence v. Commonwealth, 603 S.W.3d 214, 228 (Ky. 2020)
- DYFS v. M.C. III, 201 N.J. 328, 340-42 (2010)
- State v. A.R., 213 N.J. 542, 561 (2013)
- In re Application for Order Authorizing Pen Register, 415 F. Supp. 2d 211, 213 n.3 (W.D.N.Y. 2006)

OPINION

PER CURIAM.

SYLLABUS This syllabus is not part of the Court's opinion. It has been prepared by the Office of the Clerk for the convenience of the reader. It has been neither reviewed nor approved by the Court and may not summarize all portions of the opinion. State v. Jule Hannah (A-44-24) (089819) Argued October 9, 2025 -- Decided April 16, 2026 JUSTICE PIERRE-LOUIS, writing for a unanimous Court.

In this appeal, the Court considers whether a lay witness can testify regarding cell site location information (CSLI) -- specifically, the locations of cell towers that cell phones connect to -- or whether an expert witness is required. Defendant Jule Hannah was charged with the murder of Miguez Lopez. Detective Sergeant Kenneth Leyman obtained defendant's cell phone records.

The State asserted at trial that these records supported its theory that Lopez picked defendant up in Monroe Township and that the two men then crashed nearly an hour later in Bridgeton, where Lopez was found shot to death.

In addition to the phone records, the State introduced the testimony of a forensic scientist that a cigar butt found in Lopez's car matched defendant's DNA, as well as evidence of a recorded phone call in which a third person can be heard in addition to Lopez and the caller. Prior to defendant's trial, the trial court allowed Detective Leyman to testify as a lay witness regarding his use of phone records to map the locations of cell towers that relevant cell phones, including defendant's, connected to during the pertinent time period surrounding Lopez's death.

In limiting the scope of Detective Leyman's testimony as a lay witness, the trial court stressed that there was to be no testimony "about the location of any phone at any particular time." The trial court also gave several limiting instructions to the jury during Detective Leyman's testimony, directing that they should not consider CSLI alone as evidence that a phone was in a particular place and advising that a cell phone's connection to a cell tower does not indicate whether the cell phone was in any particular location.

Despite the trial court's instructions, Detective Leyman testified that the CSLI could indicate where a suspect was at the time of Lopez's death. His testimony also associated the cell towers to which defendant's cell phone connected to the path Lopez traveled that day, consistent with the State's theory that defendant was in Lopez's car prior to the homicide.

Then, in summation, the State told the jury that a cell phone must be close to the tower it connects to, stating that its proximity must be "a stone's throw" away. 1 The jury convicted defendant of first-degree murder and unlawful possession of a weapon.

The Appellate Division reversed defendant's conviction, finding the trial court erred in allowing Detective Leyman to testify about historical CSLI without being qualified as an expert. The Appellate Division further concluded that this inference carried significant weight in a case built largely on circumstantial evidence, where the only physical link between defendant and the victim's vehicle was DNA on a cigar butt.

The Appellate Division found the trial court's limiting instructions insufficient to cure the prejudice caused by Detective Leyman's testimony. The Court granted certification. 260 N.J. 214 (2025). HELD: Pursuant to N.J.R.E. 702, CSLI involves technical and specialized knowledge that must be presented to a jury by an expert witness at trial. 1. N.J.R.E. 701 provides the applicable standard for courts to determine the admissibility of lay witness testimony.

A lay witness may give an opinion on matters of common knowledge and observation. When testimony requires an opinion on a matter beyond common knowledge and observation, however, Rule 702 provides for the admission of expert testimony and discusses circumstances in which an expert may testify.

In case law, courts have identified circumstances in which an expert -- as opposed to a lay witness -- must testify; that is, topics that can be raised only if an expert will testify. In broad terms, when a subject is so esoteric that jurors of common judgment and experience cannot form a valid conclusion, expert testimony is required. A jury should not be allowed to speculate without the aid of expert testimony in any area where laypersons could not be expected to have sufficient knowledge or experience.

Although expert witnesses may testify to subjects that lay witnesses may not, their testimony must remain grounded in facts or data derived from (1) the expert's personal observations, or (2)

evidence admitted at the trial, or (3) data relied upon by the expert which is not necessarily admissible in evidence but which is the type of data normally relied upon by experts.

An expert's bare opinion that has no support in factual evidence or similar data is a mere net opinion which is not admissible and may not be considered. (pp. 29-32) 2. The Court reviews how cellular networks operate, the relationship between cell phones and cell towers, and the import of CSLI.

The user's proximity to a cell site is significant in determining which tower has the strongest signal. However, the strength of the signal is also influenced by the technical characteristics of the towers; geography and topography; the angle and number of antennas; the features of the phone itself; and environmental and geographical factors. Generally, courts agree that an expert, not a lay witness, must present testimony regarding technical aspects of cell towers and CSLI.

Many courts, however -- including some that have required expert testimony as to the technical aspects of CSLI -- have concluded that a witness may provide limited testimony about the contents of call records detailing the locations of cell towers utilized by a phone without being qualified as an expert. 2 But Maryland courts have rejected the argument that a layperson with the same phone records and instructions could have determined the location of the cell sites from such records.

Although the Court has not previously considered whether CSLI testimony must be offered by an expert, it recently held that expert CSLI testimony that a defendant's cell phone was likely near a crime scene was an inadmissible net opinion because it lacked factual evidence or objective data. See *State v. Burney*, 255 N.J. 1 (2023).

In *Burney*, the expert's estimate of a cell tower coverage radius was based solely on the agent's personal "rule of thumb," without reference to supporting data, scientific calculations, or specific tower characteristics such as height, power, or surrounding terrain. *Id.* at 5, 24-25. (pp. 32-41) 3.

Here, the trial court's repeated attempts to instruct the jury regarding CSLI -- see pages 10 to 23 of the Court's opinion -- illustrate the complexity of that testimony and demonstrate exactly why such evidence must be presented by an expert witness. A jury, properly informed about the intricacies and nuances of cell towers, should be able to use CSLI to place a phone in a general area.

But that cannot happen if a jury is not properly equipped with the tools necessary to understand this relevant evidence. Further, leaving the jury to draw any inferences it deemed appropriate from the non-contextualized CSLI evidence -- without a full explanation of its technical aspects and capabilities by an expert witness -- also risked confusing and misleading the jury in violation of N.J.R.E.

403. Although a jury may be able to figure out the location of cell towers using phone records, it would not be able to draw any meaningful inferences from that information without an understanding of how cell towers operate and why those cell tower locations matter. And, in the absence of expert guidance, a jury could attribute more or less weight to the tower locations than is warranted.

The Court disagrees with the approach taken by many jurisdictions -- allowing witnesses to provide limited testimony about the locations of cell phone towers that cell phones connect to without being qualified as an expert.

The technical and specialized knowledge required to interpret CSLI is beyond the ken of the average juror. Finally, the CSLI testimony that the jury heard in this case, is at odds with Burney. If an expert attempted to offer the same conclusory information that Detective Leyman did, that expert's testimony would constitute an impermissible net opinion in violation of N.J.R.E.

703 because the conclusions were unsupported by adequate data. The State cannot circumvent the standards to which expert testimony is held under N.J.R.E. 702 by presenting the testimony through a lay witness rather than an expert. (pp. 41-47) AFFIRMED. CHIEF JUSTICE RABNER and JUSTICES PATTERSON, WAINER APTER, FASCIALE, NORIEGA, and HOFFMAN join in JUSTICE PIERRE-LOUIS's opinion.

3 SUPREME COURT OF NEW JERSEY A-44 September Term 2024 089819 State of New Jersey, Plaintiff-Appellant, v. Jule Hannah, a/k/a Jule L. Hanna, Defendant-Respondent. On certification to the Superior Court, Appellate Division. Argued Decided October 9, 2025 April 16, 2026 Bethany L. Deal, Deputy Attorney General, argued the cause for appellant (Matthew J. Platkin, Attorney General, attorney; Jeremy M. Feigenbaum, Solicitor General, Michael L. Zuckerman, Deputy Solicitor General, and Bethany L. Deal, and Nathaniel I. Levy, Deputy Attorneys General, of counsel and on the briefs).

Stefan Van Jura, Assistant Deputy Public Defender, argued the cause for respondent (Jennifer N. Sellitti, Public Defender, attorney; Stefan Van Jura, of counsel and on the briefs). Maithreyi Nandagopalan (Innocence Project, Inc.) a member of the New Mexico bar, admitted pro hac vice, argued the cause for amici curiae American Civil Liberties Union of New Jersey and the Innocence Project 1 (American Civil Liberties Union of New Jersey Foundation and Innocence Project, Inc., attorneys; Dillon Reisman, Ezra D. Rosenberg, Jeanne LoCicero, and Maithreyi Nandagopalan, on the brief).

Lawrence S. Lustberg submitted a brief on behalf of amicus curiae Association of Criminal Defense Lawyers of New Jersey (Gibbons, attorneys; Lawrence S. Lustberg, Anne M. Collart, and Jessica L. Guarracino, on the brief). Howard Pashman submitted a brief on behalf of amicus curiae

Larry E. Daniel, Executive Director of the Digital Forensics Justice Initiative (Pashman Stein Walder Hayden, attorneys; Howard Pashman and CJ Griffin, on the brief).

JUSTICE PIERRE-LOUIS delivered the opinion of the Court. In this appeal, we consider whether a lay witness can testify regarding cell site location information (CSLI) -- specifically, the locations of cell towers that cell phones connect to -- or whether an expert witness is required to provide such testimony. Prior to defendant Jule Hannah's trial for murder and other offenses, the trial court allowed Detective Sergeant Kenneth Leyman to testify as a lay witness regarding his use of phone records to map the locations of cell towers that relevant cell phones, including defendant's, connected to during the pertinent time period surrounding the victim's death.

In limiting the scope of Detective Leyman's testimony as a lay witness, the trial court stressed that there was to be no testimony "about the location of any phone at any particular time." The trial court also gave several limiting instructions to the jury during Detective Leyman's testimony, directing that they should not consider CSLI alone as evidence that a phone was in a particular place and advising that a cell phone's connection to a cell tower does not indicate whether the cell phone was in any particular location.

Despite the trial court's instructions, Detective Leyman testified that the CSLI from the phone records could indicate where a suspect was during the time of the victim's death. His testimony also associated the cell towers to which defendant's cell phone connected on the morning of the victim's death to the path the victim traveled that day, consistent with the State's theory that defendant was in the victim's car prior to the homicide.

Then, in summation, the State told the jury that a cell phone must be close to the tower it connects to, stating that its proximity must be "a stone's throw" away. The jury convicted defendant of first-degree murder and unlawful possession of a weapon.

On appeal, the Appellate Division reversed defendant's conviction, finding the trial court erred in allowing Detective Leyman to testify about historical CSLI without being qualified as an expert. We granted the State's petition for certification. ³ For the reasons that follow, we affirm the judgment of the Appellate Division and hold, pursuant to N.J.R.E. 702, that CSLI involves technical and specialized knowledge that must be presented to a jury by an expert witness at trial.

I. We concentrate our recitation of the facts and procedural history on the cell phone records at the heart of this appeal, relying primarily on the testimony elicited at trial. A. On January 15, 2017, at approximately 8:30 a.m., a car crashed into a tree on Spruce Street in Bridgeton. A witness observed a man with a distinct limp and a puffy camouflage jacket quickly walking away down the road, and neighbors found an unresponsive man in the driver's seat.

A Bridgeton Police Department (BPD) officer arrived within five minutes and found the vehicle -- a gold Chrysler Sebring -- with both the driver and passenger side doors open. The driver, later

identified as Miguel Lopez, had been shot four times and had died from his wounds. During the investigation, law enforcement learned that Lopez had been in Atlantic City from about 3:30 a.m. until he left the casino in the gold Chrysler Sebring at around 6:30 a.m.

Video surveillance footage from various businesses along the route shows Lopez's car traveling toward Bridgeton and arriving there around 8:05 a.m. As the officers investigated the death, they observed spent shell casings, a bullet inside the vehicle, and ballistic evidence indicating that shots were fired from the passenger side toward the driver's side of the vehicle.

Officers also recovered a cigar butt with a plastic filter tip from the front passenger seat. One of the witnesses provided police with surveillance footage from her residence that depicted the man she saw walking away from the scene. BPD Detective Anthony Calabrese later testified he believed the man had a distinctive limp in his left leg. Law enforcement initially identified two potential suspects who were later deemed not to be involved in Lopez's death.

One of the suspects communicated via text message with Lopez the morning of his homicide and his palm prints matched those found in Lopez's car. That suspect was eliminated from consideration after his cell phone records showed that his phone, during the relevant time period, connected to cell phone towers in Millville. According to Detective Leyman, Millville was not in the general proximity of the location in Bridgeton where Lopez was shot.

Detective Leyman testified that the footage from the witness's home led him to believe that defendant could be a suspect. Detective Leyman compared the footage from the witness's home of the suspect with the limp with footage from an unrelated traffic stop in 2011 involving defendant and footage of defendant from the Cumberland County Courthouse in 2017. Detective Leyman testified at the pretrial hearing that he had previously interacted with defendant on several occasions, including an arrest in 2009.

Investigators learned that at 7:27 a.m. on January 15, defendant's cell phone records showed a call to the Monroe Township Police Department. The Monroe Township police relayed to Detective Leyman that defendant called to report his involvement in a single car motor vehicle accident in the area of Franklinville-Williamstown Road and Tuckahoe Road. At trial, the State introduced testimony from James Burnett, an eyewitness to that crash.

According to Burnett, a Black man with a bald head approached his vehicle. The man was walking with a limp and wearing a white tank top and cargo shorts. Burnett testified that he did not observe the man to be wearing a camouflage jacket. Burnett said the man offered him \$100 to drive him to Bridgeton. Burnett declined, and the man walked away. Burnett did not get a good look at the man's face and could not identify defendant at trial.

BPD sought and acquired a warrant to seize defendant's cellular devices. Detective Leyman later obtained the records, which showed the cell phone towers defendant's cell phone connected to on

the day of Lopez's homicide. 6 The State asserted at trial that these records supported its theory that Lopez picked defendant up in Monroe Township around 7:30 a.m., after defendant's car accident, and that the two men then crashed nearly an hour later in Bridgeton, where Lopez was found shot to death.

In addition to the phone records, the State introduced the testimony of a forensic scientist that the cigar butt found in Lopez's car contained DNA from a single source that matched defendant's DNA. The State further presented evidence of a recorded phone call during the relevant time period in which a third person can be heard in addition to Lopez and the caller.

B. On March 14, 2018, a Cumberland County grand jury indicted defendant on four counts related to Lopez's homicide: (1) first-degree murder; (2) second-degree possession of a weapon for an unlawful purpose; (3) second- degree unlawful possession of a weapon; and (4) second-degree possession of a weapon by a convicted person. Prior to trial, the State moved to admit Detective Leyman's testimony regarding historical CSLI.

Detective Leyman testified at a pretrial hearing that he was prepared to describe which cell towers handled each call by defendant's cell phone that morning, including details such as the specific antenna of each tower that the phone connected to and the antenna's compass 7 direction, also known as its azimuth.

The State initially sought to qualify Detective Leyman as an expert in historical cell site analysis. The prosecutor noted, "I have to qualify him as an expert in order for this testimony to come in." Although Detective Leyman lacked formal training in telecommunications or engineering, the State described him as an experienced detective who had reviewed cell phone records on at least 75 different occasions.

Detective Leyman stated he had taken a course on "high tech investigation" that covered cell phone records, and he had taught himself to interpret phone records by consulting with phone carrier personnel. Further, Detective Leyman testified that his four years in the United States Air Force provided him with specialized training in mapping and directional navigation.

Detective Leyman stated that he learned through his military service how to plot an azimuth. When the State proceeded to question Detective Leyman on the facts of the case, the defense objected on the basis that Detective Leyman's stated qualifications were insufficient for him to proceed as an expert witness.

The trial judge sought to clarify whether the State intended to present Detective Leyman as an expert or lay witness. The State responded that it "would proffer Detective Sergeant Leyman as an expert in the field of cell phone 8 record review, interpretation of cell tower data and plotting of cell tower data." The trial court directed the State to produce Detective Leyman's curriculum vitae and postponed a final ruling on whether he could testify as an expert.

The defense proceeded to cross-examine Detective Leyman on his qualifications. Detective Leyman acknowledged that his experience with historical cell site data derived primarily from on-the-job training, rather than a formal curriculum. He again testified that he was able to interpret cell phone records with the help of his military training and from conversations with cell phone company representatives.

After cross-examination, the defense renewed its objection, arguing that the State sought to introduce expert testimony -- which requires a qualified expert witness -- and not simply a lay interpretation of business records.

The trial court proposed that Detective Leyman could “say what the record says.” In other words, he could read the data points from the cell phone records and determine which cell phone tower antenna connected to defendant’s phone.

The defense protested, arguing that without an explanation of the significance of CSLI -- e.g., that it could indicate the general location of defendant’s phone -- testimony about this information would be irrelevant and confuse the jury.

The defense asserted that Detective Leyman’s testimony about CSLI should be excluded under N.J.R.E. 403. The defense further expressed concern that it would be unable to cross-examine Detective Leyman about the potential implications of the cell data if the proposed testimony was presented to the jury.

The trial judge expressed his willingness to allow Detective Leyman to testify as a lay witness if his testimony was limited “to the location of the towers and when the call hit that tower, not which antenna, not which direction the antenna was pointed in, but just that tower.” The trial court allowed the State to decide whether to attempt to qualify Detective Leyman as an expert, stressing that “there’s not going to be any testimony about the location of any phone at any particular time.” (emphasis added).

C. Trial began on June 23, 2021. Before opening statements, the State confirmed it would present Detective Leyman’s testimony “in a limited capacity as a lay witness simply regarding the investigator’s review of the records, interpretation of the records when it comes to the location of the cell towers... and him plotting out the location of the cell towers on a map.” The State added that it was “not going to have the officer testify in regards to the antenna that was accessed or... the direction that the antenna was pointing at.” The court responded: [Y]ou must be clairvoyant [be]cause my decision I was going to give you today is I’m not going to permit the 10 officer to testify about the direction of any antenna or the azimuth of any antenna nor his interpretation of the identification of any particular antenna on any tile -- tower.

Okay. We discussed that at length yesterday. The court agreed to “permit lay person testimony with regard to the location of the tower and the time when the tower connected the call.” The trial

judge went on to further limit the scope of Detective Leyman's testimony, focusing on curbing the use of CSLI for the purpose of tracking defendant's movements on the morning of Lopez's death: I'm not going to permit testimony about the cell tower location upon the termination of the call unless there is significant distance between the start and ending of the call because the switching between the towers is not necessarily confined solely to the distance traveled by an individual on the phone.

Cell tower switching is a complicated issue, depends on signal strength. We don't have an expert to testify as to why a tower may switch. I think it's clear that in order to get any directional data from a cell tower dump you're going to need an expert to explain to the jury how the cell tower works. Soon thereafter, the court issued an order regarding Detective Leyman's testimony.

The order stated that "the parties stipulate" that Detective Leyman "shall be permitted to provide only lay witness testimony regarding his review, interpretation, and plotting of the location of cell towers on a map from the defendant's historical cell site data records" and specified that "[t]here shall be no testimony concerning the azimuth of any antenna or any cell tower sector accessed by any call within the defendant's call detail records." ¹ Finally, the order provided that the State could offer testimony about "the cell phone tower indicated at call termination" "without further order from the Court," but "[o]nly when the same cell tower was utilized for a cell phone call's origination and termination." On June 25, 2021, Detective Leyman testified regarding the CSLI obtained during the investigation.

The State asked Detective Leyman whether, in his "training and experience," he had "been able to learn how to read phone records, call detail records, and the information contained therein," to which he responded affirmatively. When asked whether those records include "an indication... as to what cell tower the phone would have access to," Detective Leyman replied, "[y]es." Detective Leyman then testified that the phone call records denote the time that a cell tower is accessed.

He explained, in the following exchange with the State, the information those records may provide regarding a user's location: STATE: And would those phone records have provided information regarding where [one of the initial 1 "Call detail records" are records that include "the phone numbers dialed out from [a] cell phone, the phone numbers dialed in to that phone, and the date, time, and duration of those calls." State v. Lunsford, 226 N.J.

129, 133 (2016). 12 suspects] may have been located at the time that the homicide occurred? LEYMAN: Yes. STATE: In particular, whenever a phone call is made or received, again, would that phone have to connect to a tower in order to make or receive the phone call? LEYMAN: Yes. STATE: And would that tower provide a -- a approximate location as to where that phone may have been located at the time?

LEYMAN: Yes. [(emphases added.)] Detective Leyman testified that the initial suspect placed calls around the time of the homicide that connected to a cell tower that was not near the location of the crime scene. Later during his testimony, Detective Leyman testified about defendant's cell site data from the morning of Lopez's death.

The State introduced redacted records provided by Sprint regarding defendant's phone that morning, which were displayed to the jury. Detective Leyman indicated that he had reviewed cell phone records from Sprint before. He described how to interpret each line item from the records by explaining how to determine whether entries represented a phone call or a text message; the number that initiated the call or text; the number that received the call or text; whether the call connected; the duration of the call; and which cell towers the phone connected to at the beginning and end of each call.

The State then asked whether Detective Leyman "ha[d] an opportunity to essentially plot out and determine what tower was being accessed [by defendant's phone] when certain incoming and outgoing calls were made during" the relevant time period of Lopez's death, to which he responded, "[y]es." The State proceeded to walk through defendant's phone records with Detective Leyman and discussed the call entries, including the starting and ending time of the calls and location of each cell tower to which defendant's phone connected.

After Detective Leyman reviewed two records, the trial judge indicated that he wanted to give a limiting instruction regarding the detective's testimony. The trial judge provided the following instruction: All right. Ladies and gentlemen, you've heard some testimony here about a call connecting to a cell phone tower at a particular time and a particular location.

In conjunction with that the State has also shown you a location where someone was purported to be or an event was purported to have happened sometime relevant to the proceedings here. I want to make it clear to you that while they can show you those locations and how far apart they are that evidence does not establish where that phone was at any -- at that time that that call connected.

Do you understand? It doesn't -- just because there is a cell tower somewhere proximate to something else 14 doesn't mean that that phone was located any particular spot within any particular distance from that tower. Does everybody understand that? So that is -- you should not consider that that evidence was that phone was there or here or any other particular place, only that there was a call received at that location and that at the same time something else was happening at another location and they were so far apart.

But that's for you to determine, you know, where that information might be considered in the decisions you need to make here. But that fact that there was a phone call received at that tower does not mean that phone was in any particular location. You understand? So all you know is that a

call connected at a certain time at that location and there was something else that happened somewhere around there.

That doesn't mean that that phone was in any particular spot at the time that that phone call was made? Okay? All right. Testimony resumed and the State continued to question Detective Leyman about the call records.

For each record, the prosecutor attempted, through questioning of Detective Leyman, to draw a connection between the call entry and a relevant location, such as defendant's motor vehicle crash before the homicide: STATE: And, again, I won't go through it again because we already pulled it up previously. But that tower from what you could tell in your review was in close proximity to the location of the defendant's motor vehicle crash?

LEYMAN: Approximately 3,000 feet, yes. 15 STATE: Okay. And the call would have connected to that tower at the same time he would have allegedly, or yes, been in that area? THE COURT: I want to strike that question. Ladies and gentlemen, you cannot infer simply by looking at where a tower is and where a phone call may have been made at that that where the call originated from and therefore connected to that tower.

STATE: And, judge, respectfully, that -- that what -- I'll rephrase the question. THE COURT: You better rephrase that question, counsel. STATE: The tower that the phone connected to is approximately 3,000 feet away from the site of the location, correct? LEYMAN: Yes.

As the prosecutor and Detective Leyman continued discussing call entries, the prosecutor repeatedly asked whether "directionally speaking," the cell tower utilized by the call being discussed was "north or south of the last tower that was accessed." Altogether, the prosecutor asked Detective Leyman about 16 call entries, each time comparing the data to the known locations of the victim's vehicle at the time that the call was placed.

The next trial day, before Detective Leyman's cross-examination began, the court issued another limiting instruction regarding the prior CSLI testimony: 16 Now, you recall last week there was some testimony concerning cell tower and cell tower locations. And I -- when that testimony came up I gave you what we call limiting instruction with regard to that. I'm going to give you a similar limiting instruction.

It's on the same issue. Doesn't change what I told you last week. It may just clarify it. Okay. So pay attention here. There was testimony regarding the location of cell phone towers which connected phone calls from a particular phone. You may not use the location of the cell phone tower to determine the location of the phone making the phone which connected to the tower.

The location of any particular phone at any particular time is a question -- is a question of is an independent -- I think what they meant to say was that's an independent question of fact that you

must decide for yourself. Do you understand? So the cell tower going off right there does not mean that cell is in any particular spot, which is what I told you.

You have to -- if you -- if you need to determine that fact, you determine it from all the facts, you understand, not just that that cell tower went off. You understand? That cell tower doesn't tell you that that phone was there or there. It tells you the phone connected that cell tower. That fact and any other facts you can use if you need to determine where a phone may or may not have been.

But a cell tower location doesn't establish that it was in any particular spot. Does everybody understand that? Okay. All right. On cross-examination, defense counsel pressed Detective Leyman on the types of information CSLI cannot provide: DEFENSE: So let's talk about the cell towers. So now we've agreed that the cell phone records can't tell us who -- first of all, they don't tell us what person actually had that phone in their hand, correct?

17 LEYMAN: That's correct. DEFENSE: We just know the phone number, right, not the actual phone. LEYMAN: Yes. DEFENSE: All right. And you would agree that you can't tell the location of the phone just based upon the tower that the call connected to, right? LEYMAN: Exact location, no. DEFENSE: And you would agree that the records reflect that the tower that the phone connected to which is not necessarily the tower that is closest to the actual phone, correct?

LEYMAN: Correct. DEFENSE: And the phone records do not reflect any distance of the phone in proximity to the tower, correct? You don't get that from the records. LEYMAN: Correct. Defense counsel confirmed with Detective Leyman that, between 8:07 a.m. and 9:37 a.m. on the day of the homicide, defendant's phone connected to tower 37 -- located on the corner of Commerce Street and Pearl Street in Bridgeton -- 16 times.

Detective Leyman clarified that defendant's phone also connected to a second tower at 8:50 a.m. -- tower 304. On re-direct, the State and Detective Leyman had the following exchange: 18 STATE: So the tower's hitting off of -- or strike that.

The defendant's phone is hitting off of tower 37 before, during and immediately after the homicide, is that fair? LEYMAN: Yes. STATE: So just to go through that again briefly. The tower that we're talking about, is that located right there? LEYMAN: Yes. STATE: And the defendant's residence, 35 Reeves Road. LEYMAN: Yes. STATE: And, again, the scene of the crime, 406 Spruce Street.

LEYMAN: Correct. STATE: And to be clear, is both the defendant's residence and the scene of the crime in proximity to the cell phone tower in question? LEYMAN: Yes. STATE: And you also indicated that there was a point in time -- what was that time again where the tower -- the phone hits off of the tower 304? LEYMAN: 8:50 and 42 seconds in the morning. STATE: And what is the latitude and longitude of that tower?

19 LEYMAN: Latitude 39.392194 by longitude negative 75.216329. STATE: Now, is that tower located towards the area the suspect is seen walking or away from the area the suspect is seen walking? LEYMAN: Toward. The trial judge subsequently provided his third limiting instruction on Detective Leyman's testimony with respect to CSLI: Ladies and gentlemen, before we go on I'm going to give you another one of those limiting instructions.

Okay. Please follow along. It's along the lines of what we talked about before. Has to do with the cell tower. Okay. You heard some testimony that a -- that a call referenced in this information may have switched from one cell tower to another cell tower. Now, that information alone is insufficient to prove the phone moved. Do you understand? So simply that alone, you can't say that phone went anywhere when it switched from one tower to another tower.

However, in conjunction with other evidence you may -- you may reach a conclusion -- you're not prohibited, but if it's just that it switched you can't use that to conclude that cell phone moved. Does everybody understand? Okay. Very well. Detective Leyman's testimony concluded the State's case-in-chief. During summation, the State argued that "[c]ommon experience dictates that you have to be close to a [cell] tower in order to connect to a call." The prosecutor then told the jury: 20 [C]ontrary to what [defense counsel] told you, this is one way that you can confirm that when a call is made is received that phone has to be close to the tower that's being accessed.

I'd say it's a stone's throw. That's maybe a bit of an exaggeration. I don't know if anybody has that good of an arm. But if you recall from Detective Leyman's testimony, he indicated is approximately a mile, if not a mile and a half, between those two locations. 2 [(emphasis added.)] The State further argued that defendant's phone was "clearly moving with the victim because it's hitting off of towers [in] the same direction that the victim is traveling" and that "it's a fair conclusion that the defendant was in proximity to all of the towers, all of the towers that you see where he's moving." Defense counsel objected to the prosecution's closing argument, specifically the references to the cell phone tower evidence.

The defense stressed that, in its June 24, 2021 order, the court had ruled that the mere location of a cell tower cannot be used as evidence to determine the actual location of a phone or person in the case. Defense counsel acknowledged that the prosecutor at times noted that cell phone data could be used alongside other evidence, including surveillance footage and photographs, to reach a 2 The two locations the prosecutor referenced were the site of defendant's single-vehicle accident and the cell tower that defendant's cell phone connected to around the time of that accident.

21 conclusion about defendant's location. However, defense counsel objected to instances in which the prosecutor implied that the jury could determine defendant's location based solely on tower location. The trial judge responded that, while cell phone tower data alone does not establish location, it may do so in conjunction with other evidence. Defense counsel further objected to the prosecutor's argument in summation that "the [defendant's] phone is clearly moving with the

victim because it's hitting off of towers the same direction that the victim is travelling." Counsel asserted that such conclusions were impermissible without supporting evidence.

The trial judge disagreed, stating that it was not "beyond the ken of an average juror to realize that the closer you're to a tower... the stronger your signal is." During the final jury charge, the trial judge provided additional instructions to the jury regarding CSLI: During the trial you heard testimony about phone calls connected to cell towers that were providing -- provided information as to the location of a certain cell tower accessed during that call.

In any case where a particular call started connected to one tower and switched to a different tower you may not conclude from that information alone that the cell phone changed position or moved in any particular direction. If you believe it is appropriate to do so, you may, however, consider that fact with -- along with other facts that you may find relevant to the issue of whether a cell phone moved or if it moved in any specific direction.

But you 22 cannot reach a conclusion about the movement of a cell phone based only upon the fact that a call switched between towers. Now, ladies and gentlemen, that same principle applies to a series of calls. You understand? You cannot conclude, and I think I -- I don't know whether that instruction got in here or not, but you can't conclude that a phone was in any particular spot simply because it connected to a tower.

You can, however, utilize that information along with other information if you think it's appropriate to do so. You understand? But that information alone doesn't mean that cell phone was in any particular spot. You'd have to have other evidence to rely upon and you could use that evidence in conjunction with it. Do you understand what I'm saying? So the cell phone tower alone just cause it's hitting off that tower doesn't mean it's in any particular spot.

There has to be -- you'd have to be relying on some other evidence in connection with that to make that determination. Does everybody understand this? And, again, that's if you believe it is appropriate to do so. You understand? You're the finders of fact. You decide whether or not that's relevant to what you -- what you're determining. D. The jury found defendant guilty of first-degree murder, unlawful possession of a weapon, and possession of a firearm with an unlawful purpose.

Defendant moved for a new trial, arguing that Detective Leyman's testimony exceeded the bounds of the court's order. The trial judge denied the motion, stating that Detective Leyman reiterated rather than interpreted the cell tower information; that "[t]he correlation with regard to direction and location were 23 done through other evidence" and were not "improper"; and that a jury could "infer that the phone was traveling along this road -- [R]oute 77 and as it traveled along cell tower information they could rely upon to say, okay, the cell tower rang up that phone at some point or was in contact with that phone." The trial court sentenced defendant to a 45-year prison term on

the murder conviction, subject to an 85% parole ineligibility period pursuant to the No Early Release Act, and a concurrent sentence of 10 years in prison with five years of parole ineligibility for unlawful possession of a weapon.

E. On appeal, defendant argued that the admission of historical cell site data through lay witness testimony, rather than expert testimony, was improper and violated his right to a fair trial. The Appellate Division agreed and reversed and remanded for a new trial, holding that the trial court erred by permitting historical CSLI to be introduced through lay testimony rather than through a qualified expert.

Although the trial court denied the State's request to admit Detective Leyman as an expert, it nevertheless permitted him to offer testimony interpreting and mapping the locations of cell towers accessed by defendant's phone.

The appellate court found that this testimony went beyond the permissible scope of lay witness opinion and addressed a central factual issue in dispute: whether defendant was in the victim's vehicle around the time of the shooting.

The Appellate Division further concluded that this inference carried significant weight in a case built largely on circumstantial evidence, where the only physical link between defendant and the victim's vehicle was DNA on a cigar butt.

The Appellate Division found the trial court's limiting instructions insufficient to cure the prejudice caused by Detective Leyman's testimony. We granted the State's petition for certification. 260 N.J. 214 (2025).

We also granted leave to appear as friends of the court to the American Civil Liberties Union of New Jersey and the Innocence Project, Inc. (jointly, ACLU), the Association of Criminal Defense Lawyers of New Jersey (ACDL), and Larry E. Daniel, Executive Director of the Digital Forensics Justice Initiative. II.

The State asks this Court to reverse the Appellate Division's decision. The State argues that Detective Leyman properly testified about the cell phone tower locations as a lay witness. The State asserts that the trial court accepted the parties' stipulated agreement 3 and permitted Detective Leyman to testify in 3 A party that stipulates or consents to the admission of certain evidence at trial may sometimes be prohibited from objecting to that evidence on appeal under the invited error doctrine.

See *DYFS v. M.C.* III, 201 N.J. 328, 340-42 25 a manner consistent with other courts across the country that have confronted the same issue. According to the State, cell towers listed in phone company records can be identified through lay testimony because determining the location of cell towers that a particular cell phone connected to does not require expertise.

The State further contends that a jury is free to draw reasonable inferences from this testimony. Defendant argues that specialized expertise is necessary to interpret historical CSLI and describes the language in the Sprint cell phone records as “bewildering” and full of technical “jargon.” He asserts that a layperson would have difficulty determining the geographic coordinates of a cell tower to which a phone connected and would be unable to draw meaningful conclusions from the records without expert guidance.

Defendant also argues that testimony about cell tower locations, without explanation of their coverage area, is misleading and should be proscribed under N.J.R.E. 403. (2010). The doctrine in part serves to bar litigants “from raising an objection for the first time on appeal.” *State v. A.R.*, 213 N.J. 542, 561 (2013).

The invited error doctrine, however, does not apply here. As the State recognized during oral argument before this Court, defense counsel preserved this issue for appeal through a timely objection at trial. Specifically, defense counsel stated the following on the record: “I wanted to preserve for the record that all my objections to those records that we previously dealt with through in limine motions and objections...

I’m not waiving any of those prior arguments or objections by consenting to the admission of the records today.”²⁶ Several amici curiae support defendant’s position and argue that an expert should be required to testify about raw CSLI data when used to locate a phone.

The ACLU argues that CSLI cannot accurately pinpoint a phone’s location -- it can only indicate that a phone was somewhere within a cell tower’s broad coverage area, which can extend for miles. The ACLU asserts that jurors are unlikely to understand the technical limits of CSLI and that limiting instructions are insufficient to cure potential prejudice or confusion.

According to the ACLU, when the State fails to produce an expert for this testimony, defendants are deprived of an opportunity to meaningfully cross-examine a witness about the limits of CSLI. Amicus curiae Larry E. Daniel argues that phone call records do not directly establish a phone’s location or proximity to towers and emphasizes the risk of overstating the precision of such evidence.

Daniel conveys that many factors -- such as natural terrain, buildings, weather, antenna strength and height, network load balancing, technical capabilities of the phone, and equipment malfunction or installation errors -- can cause a phone to connect to a more distant site than the closest cell tower. Daniel asserts that experts are needed to explain the implications and limitations of CSLI to ensure that the factfinder is not misled by oversimplified conclusions.

²⁷ Similar to Daniel, the ACDL argues that conclusions cannot be drawn about a cell phone’s location based on call records without consideration of numerous variables -- an analysis that is not within the ken of the average juror.

The ACDL argues that the interpretation and explanation of call detail records is itself a technical task that requires an expert with specialized knowledge and training. III. A. We review a trial court's evidentiary rulings for abuse of discretion. *State v. Allen*, 254 N.J. 530, 543 (2023).

We do not substitute our judgment for that of the trial court “unless the evidentiary ruling is ‘so wide of the mark’ that it constitutes ‘a clear error in judgment.’” *State v. Garcia*, 245 N.J. 412, 430 (2021) (quoting *State v. Medina*, 242 N.J. 397, 412 (2020)). Regarding limiting instructions from a trial court, we have acknowledged that, “in appropriate cases,” “a proper limiting instruction can cure any potential juror confusion” about admitted evidence.

Hrymoc v. Ethicon, 254 N.J. 446, 474 (2023). When limiting instructions themselves are incomplete or unclear, however, they can compound the prejudice caused by erroneous evidentiary determinations. See, e.g., *State v. Jones*, 425 N.J. Super. 258, 276 (App. Div. 2012); see also *State v. Sanchez-Medina*, 231 N.J. 452, 28 465 (2018) (holding that the trial court compounded the prejudice caused by the erroneous admission of defendant's immigration status by issuing conflicting and incomplete instructions regarding the permissible use of that evidence).

B. Pursuant to N.J.R.E. 401, “relevant evidence” is defined as evidence having “a tendency in reason to prove or disprove any fact of consequence to the determination of the action.” Relevancy is a combination of “probative value and materiality.” *State v. Higgs*, 253 N.J. 333, 358 (2023) (quoting *State v. Buckley*, 216 N.J. 249, 261 (2013)) (internal quotations omitted).

Relevant evidence is admissible only if no exception applies. N.J.R.E. 401, 402. One such exception is N.J.R.E. 403(a), which provides that “relevant evidence may be excluded if its probative value is substantially outweighed by the risk of... [u]ndue prejudice, confusing the issues, or misleading the jury.” Those rules apply to all evidence, including the testimony of lay and expert witnesses.

N.J.R.E. 701 provides the applicable standard for courts to determine the admissibility of lay witness testimony. *State v. Sanchez*, 247 N.J. 450, 466 (2021). The rule states that a non-expert witness's “testimony in the form of opinions or inferences may be admitted if it: (a) is rationally based on the witness's perception and (b) will assist in understanding the witness's testimony or determining a fact in issue.” N.J.R.E.

701. As this Court has noted in the past, “[t]here are, however, limits that have traditionally been imposed on lay opinion testimony.” *State v. McLean*, 205 N.J. 438, 459 (2011). Specifically, N.J.R.E. 701 “does not permit a witness to offer a lay opinion on a matter ‘not within [the witness's] direct ken... and as to which the jury is as competent as [the witness] to form a conclusion.’” *Ibid.* (quoting *Brindley v. Firemen's Ins.*

Co., 35 N.J. Super. 1, 8 (App. Div. 1955)). This Court has recognized that a “lay witness may give an opinion on matters of common knowledge and observation.” *State v. Bealor*, 187 N.J. 574, 586

(2006) (quoting *State v. Johnson*, 120 N.J. 263, 294 (1990)). When testimony requires an opinion on a matter beyond “common knowledge and observation,” however, Rule 702 provides for the admission of expert testimony.

N.J.R.E. 702 states: If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise. Rule 702 discusses circumstances in which an expert may testify.

In case law, courts have identified circumstances in which an expert -- as opposed to a lay witness -- must testify; that is, topics that can be raised only if an expert will testify. In broad terms, “when ‘a subject is so esoteric that jurors of common judgment and experience cannot form a valid conclusion,’” “expert testimony is required.” *Hopkins v. Fox & Lazo Realtors*, 132 N.J.

426, 450 (1993) (quoting *Wyatt by Caldwell v. Wyatt*, 217 N.J. Super. 580, 591 (App. Div. 1987)); see also *Biunno, Weissbard & Zegas*, Current N.J. Rules of Evidence, cmt. 2 on N.J.R.E. 702 (2025) (“[A] jury should not be allowed to speculate without the aid of expert testimony in any area where laypersons could not be expected to have sufficient knowledge or experience.”).

Applying that rule, courts have required expert testimony in certain cases. In *Wyatt*, for example, the Appellate Division held that, in an automobile negligence case, eyewitness lay testimony about brake fluid and brake pad condition was improper without expert testimony linking those observations to the alleged brake failure. 217 N.J. Super. at 591-92. And in *Taing v. Braisted*, the trial court ruled that the complex factors affecting whether a car’s airbag deploys in an accident -- including the amount and direction of force and the operation of airbag sensors -- require expert explanation, and that lay testimony alone is insufficient for a jury to understand or determine the relevance of airbag deployment.

456 N.J. Super. 465, 469-71 (Law Div. 2017); see also *Morales-Hurtado v. Reinoso*, 457 N.J. 31 Super. 170, 193 (App. Div. 2018) (holding that lay testimony regarding whether airbags deployed in a rear-end collision was inadmissible because an expert was needed to determine whether airbags are engineered to deploy in such collisions and that, without an expert, such testimony “might have been misleading”).

Although expert witnesses may testify to subjects that lay witnesses may not, their testimony must remain “grounded in facts or data derived from (1) the expert’s personal observations, or (2) evidence admitted at the trial, or (3) data relied upon by the expert which is not necessarily admissible in evidence but which is the type of data normally relied upon by experts.” *Townsend v. Pierre*, 221 N.J.

36, 53 (2015) (quotation omitted). “[A]n expert’s bare opinion that has no support in factual evidence or similar data is a mere net opinion which is not admissible and may not be considered.”

Pomerantz Paper Corp. v. New Cmty. Corp., 207 N.J. 344, 372 (2011). C. We briefly describe how cellular networks operate, the relationship between cell phones and cell towers, and the import of CSLI. “Cellular networks are comprised of many cells (colloquially ‘towers’), containing antennas, cell electronics, and links to the network controlling computers located at each network operator’s regional offices.” Vladan M. 32 Jovanovic & Brian T. Cummings, *Analysis of Mobile Phone Geolocation Methods Used in US Courts*, 10 IEEE Access 28037, 28037 (2022).

A cell phone connects to this network “like a scanning radio” and “use[s] radio waves to communicate between a user’s handset and a telephone network.” *State v. Earls*, 214 N.J. 564, 576 (2013). “To connect with the local telephone network, the Internet, or other wireless networks, cell-phone providers maintain an extensive network of cell sites, or radio base stations, in the geographic areas they serve.” *Ibid.* When a cell phone user places a call or sends a text message, the phone generally “connects to the cell site with the strongest signal.” Aaron Blank, *The Limitations and Admissibility of Using Historical Cellular Site Data to Track the Location of a Cellular Phone*, 18 *Richmond J.L. & Tech.*

1, 5 (2011). The user’s proximity to a cell site is significant in determining which tower has the strongest signal. *Earls*, 214 N.J. at 576. However, the strength of the signal is also influenced by the technical characteristics of the towers; geography and topography; the angle and number of antennas; the features of the phone itself; and “environmental and geographical factors.” *United States v. Hill*, 818 F.3d 289, 295-96 (7th Cir.

2016) (quoting Blank, 18 *Richmond J. L. & Tech.* at 7). “Unlike the more precise location data provided by a Global Positioning System (GPS), cell site analysis simply confirms that the phone 33 was somewhere within the coverage radius of the cell tower during the recorded activity.” *State v. Burney*, 255 N.J. 1, 22 (2023) (citing James Beck et al., *The Use of Global Positioning (GPS) and Cell Tower Evidence to Establish a Person’s Location -- Part II*, 49 *Crim.*

L. Bull. 637, 645 (2013)). Historical CSLI can be useful in determining a phone user’s geolocation. For instance, it can help “identify the general area [where] the target mobile phone number is located at the time of a specific call,” even if it “cannot pinpoint the exact location of the mobile phone.” *In re Application for Ord. Authorizing Pen Register*, 415 F. Supp. 2d 211, 213 n.3 (W.D.N.Y.

2006) (quoting a Verizon representative). “Individual cell[towers] can cover distances from a fraction of [a] mile to many miles and are usually split in sectors. Sectors are split up areas around the cell covered by their own directive antennas.” Jovanovic, 10 IEEE Access at 28037-38. Generally, courts agree that an expert, not a lay witness, must present testimony regarding technical aspects of cell towers and CSLI.

See, e.g., *Hill*, 818 F.3d at 299; *State v. Boothby*, 951 N.W.2d 859, 876 (Iowa 2020); *State v. Sinnard*, 543 P.3d 525, 544 (Kan. 2024); *State v. Wyman*, 107 A.3d 641, 647- 48 (Me. 2015); *State v. Payne*, 104 A.3d 142, 154-55 (Md. 2014). Many courts, however -- including some that have required expert testimony as to the technical aspects of CSLI -- have concluded that a witness 34 may provide limited testimony about the contents of call records detailing the locations of cell towers utilized by a phone without being qualified as an expert.

See, e.g., *United States v. Graham*, 796 F.3d 332, 365-66 (4th Cir. 2015) (holding that testimony regarding a map of cell sites to which a cell phone connected “did not amount to an expert opinion” because mapping “required little more than identification of the various locations” drawn from records), *rev’d on other grounds*, 824 F.3d 421 (4th Cir. 2016) (*en banc*); *Boothby*, 951 N.W.2d at 878 (allowing testimony limited to identifying the location of cell towers pinged by the defendant’s phone because it was based on “factual information obtained from [phone] records rather than any specialized knowledge about how cell towers operate”); *Sinnard*, 543 P.3d at 544 (permitting lay testimony “so long as the witness does not” provide a “technical opinion regarding... the location of a cell phone at a particular time,... [or] an explanation as to why a cell phone connected to a specific cell tower over another”); *Torrence v. Commonwealth*, 603 S.W.3d 214, 228 (Ky.

2020) (“[M]arking points on a graph -- in these cases a map -- based on a cell phone report including latitude and longitude of cell towers, does not require an expert.”); *State v. Blurton*, 484 S.W.3d 758, 771 (Mo. 2016) (“‘[R]eading the coordinates of cell sites from phone records and plotting them on a map is not a scientific procedure or technique’ because cell phone records are factual 35 records and no special skill is required to plot these records.” (quoting *State v. Patton*, 419 S.W.3d 125, 130 (Mo.

App. 2013))); *Burnside v. State*, 352 P.3d 627, 636 (Nev. 2015) (holding that detective’s testimony about a map he created to plot cell phone tower locations was admissible lay testimony); *Wyman*, 107 A.3d at 648 (“A witness need not be an expert to explain that the timing column on a cell phone billing record refers to the time at which a call was made or received, or to explain that the ‘origination’ column refers to the location of the cell tower used by a phone to make or receive a call.”).

Maryland courts have reached a different conclusion. In *Payne*, the defendant and his co-defendant were convicted of felony murder, kidnapping, and use of a handgun in the commission of a felony. 104 A.3d at 143. At trial, a police detective testified that by interpreting *Payne*’s cell phone records, he was able to plot the location of cell phone towers that defendant’s phone connected to on a map in relation to the crime scene.

Ibid. Defense counsel objected, arguing that this testimony required an expert. *Ibid.* Rejecting the State’s argument that a “layperson with the same phone records and instructions could have

determined the location of the cell sites,” the Supreme Court of Maryland determined that a “Call Detail Record contains a string of data unfamiliar to a layperson” and the State’s witness relied on his specialized knowledge to understand the record’s “technical language” to 36 “hone in on the entries... ‘pertinent’ to the case,” and “eliminate ‘extraneous’ data.” Id. at 154.

The court held that “additional training and experience were required to parlay the process from which [the State’s witness] derived the communication path of each call.” Id. at 155. Ultimately, the Maryland court held that by “merely read[ing] Sprint Nextel’s business records and follow[ing] its directions in interpreting the data,” the State’s expert engaged in a process “beyond the ken of an average person” in order to conclude that the defendant’s phone communicated with particular cell towers.

Id. at 154; see also *Wilder v. State*, 991 A.2d 172, 197 (Md. App. 2010) (noting the appropriateness of “preserv[ing] the distinction between lay and expert opinion testimony,” in part to “ensure[] that a party will not evade the expert witness disclosure requirements... by simply calling an expert witness in the guise of a layperson”).

Although this Court has not previously considered whether CSLI testimony must be offered by an expert, we recently addressed CSLI testimony in considering whether expert testimony that a defendant’s cell phone was likely near a crime scene was an inadmissible net opinion. *Burney*, 255 N.J. at 25.

In *Burney*, the prosecution’s expert, an FBI special agent, testified that the coverage radius of a relevant cell tower was approximately one mile, placing defendant’s cell phone near the crime scene at the time of a nighttime home invasion and robbery. Id. at 5. That estimate was based solely on the agent’s personal “rule of thumb” for towers in the area, without reference to supporting data, scientific calculations, or specific tower characteristics such as height, power, or surrounding terrain.

Id. at 5, 24-25. The defense argued that the agent’s “rule of thumb” methodology was unreliable and constituted a net opinion because it lacked factual evidence or objective data. Id. at 24. We agreed and held that the testimony was an inadmissible net opinion that should not have been presented to the jury. Id. at 25. This Court noted in *Burney* that the Seventh Circuit has recognized the possibility that a “‘jury may overestimate the quality of the information provided by’” cell site data analysis and has “admonished that ‘[t]he admission of historical cell-site evidence that overpromises on the technique’s precision -- or fails to account adequately for its potential flaws -- may well be an abuse of discretion.’” Id. at 22 (quoting *Hill*, 818 F.3d at 299).

In *Hill*, the Seventh Circuit cautioned the Government against “present[ing] historical cell-site evidence without clearly indicating the level of precision -- or imprecision -- with which that particular evidence pinpoints a person’s location at a given time.” *Hill*, 818 F.3d at 299.

In that case, the court ultimately concluded that admission of the expert's testimony was not an abuse of discretion because he "made the jury aware not only of the technique's potential pitfalls, but also of 38 the relative imprecision of the information he gleaned from employing it in th[at] case." *Ibid.* The Second Circuit also addressed this issue in a Connecticut case where a family died in a tragic house fire resulting from suspected arson.

United States v. Natal, 849 F.3d 530, 532-33 (2d Cir. 2017). The defense sought to present a theory that the home's landlord was a plausible suspect in the arson. *Id.* at 534. To rebut this, the government sought to introduce testimony from a Sprint Nextel employee that on the night of the fire, the landlord's cell phone connected to cell towers in New York City and not in New Haven, Connecticut.

Ibid. The government did not seek to qualify the witness as an expert under Fed. R. Evid. 702 but called him to testify as a records custodian. *Id.* at 534-35. The trial court admitted the testimony over the defendants' objection. *Id.* at 535.

The Second Circuit concluded that admission of this testimony was improper and held that "testimony on how cell phone towers operate must be offered by an expert witness." *Id.* at 536 (joining the Seventh and Tenth Circuits in this holding).

The court further noted that "the line between testimony on how cell phone towers operate, which must be offered by an expert witness, and any other testimony on cell phone towers, will frequently be difficult to draw, and so both litigants and district courts would 39 be well advised to consider seriously the potential need for expert testimony." *Ibid.* IV.

Applying those principles, we hold that Detective Leyman's testimony regarding CSLI was improperly admitted as lay opinion testimony. The CSLI testimony should have been presented by a witness qualified as an expert pursuant to N.J.R.E. 702 because the technical aspects of CSLI are beyond the ken of the average juror.

Before the start of trial, the court attempted to draw a line between CSLI testimony that simply presented tower location information and testimony about the technical aspects of how cell towers operate. But as the Second Circuit has cautioned, "the line between testimony on how cell phone towers operate, which must be offered by an expert witness, and any other testimony on cell phone towers, will frequently be difficult to draw." *Natal*, 849 F.3d at 536.

This principle became evident in the trial court's many limiting instructions to the jury. The trial court ordered that Detective Leyman could provide only "lay witness testimony regarding his review, interpretation, and plotting of cell towers on a map from defendant's historical cell site data records." The court prohibited lay witness testimony about the direction in which cell towers 40 transmit and receive calls.

Additionally, the court barred testimony about calls that were connected to one cell tower at the start of the call but to a different tower at the end of the call. Then, through a series of instructions, the trial court thoughtfully attempted to clarify how and for what purpose the jury could consider the CSLI evidence.

The court's repeated attempts to instruct the jury regarding CSLI illustrate the complexity of that testimony and demonstrate exactly why such evidence must be presented by an expert witness. At trial, the jury first heard about CSLI through a series of questions posed by the prosecutor. Through his responses, Detective Leyman asserted that CSLI can reveal where a person was located at a particular time.

Specifically, when asked whether "those phone records [would] have provided information regarding where [the suspect] may have been located at the time that the homicide occurred?," Detective Leyman answered, "[y]es." That is exactly the testimony -- precise location information -- the trial court ordered could not be presented to the jury. Detective Leyman then testified about defendant's cell site location records, explaining how he plotted the locations of each cell tower that defendant's cell phone connected to during the relevant time period.

Throughout his testimony, Detective Leyman associated the cell towers to 41 which defendant's cell phone connected with the path the victim traveled the morning of his death. After the start of Detective Leyman's testimony, the trial judge gave a limiting instruction to the jury that they should not consider the evidence to mean that the cell phone was "there or here or any other particular place" -- instructions that completely contradicted Detective Leyman's testimony that the phone records could help identify a person's location.

Detective Leyman's testimony, in combination with the attempted curative instructions, had the potential to confuse and mislead the jury absent an expert witness's testimony to clarify the import -- and limitations -- of the CSLI evidence. Furthermore, although the trial court tried to clarify the permissible use of cell site evidence for the jury through multiple limiting instructions, those efforts were potentially undone by the prosecutor's comments in summation.

After the trial court advised the jury multiple times that the cell tower evidence they heard does not indicate where a cell phone was located, the prosecutor told the jury that a "phone has to be close to the tower that's being accessed. I'd say a stone's throw." The prosecutor also stated that the records showed defendant's "phone... clearly moving with the victim because it's hitting off of towers [in] the same direction that the victim is traveling." Those comments in summation, particularly the prosecutor's statement that the phone 42 must be a stone's throw away from the tower, essentially told the jury that a cell phone must be fairly close to a cell tower to connect.

Throughout its three limiting instructions, the trial court repeatedly told the jury that the cell tower data does not provide location information: "[T]he fact that there was a phone call received at that

tower does not mean that phone was in any particular location”; “the location of any particular phone at any particular time is... an independent question of fact that you must decide for yourself”; “That cell tower doesn’t tell you that phone was there or there.

It tells you the phone connected that cell tower.” So the State’s comments in summation directly contravened the trial court’s instruction to the jury about what they could infer from the CSLI testimony absent other corroborating evidence. Additionally, the trial court’s final jury charge was not clear enough to neutralize any confusion caused by the prosecutor’s closing remarks.

In response to defense counsel’s objection, the trial court instructed the jurors that they could not “conclude that a phone was in any particular spot simply because it connected to a tower.” But the court then added, “[y]ou can, however, utilize that information along with other information if you think it’s appropriate to do so.” The mixed messages to the jury regarding the significance of CSLI should have been clarified by the testimony of an expert 43 witness, which would have also made it possible to provide adequate instructions to the jury about the permitted use of CSLI.

CSLI, by definition, is not exact. Exact location information must instead be obtained via GPS -- information an expert witness could have explained to the jury. But CSLI does provide information on a cell phone’s general location.

For a phone to connect to a particular cell phone tower, that phone must be within that tower’s coverage range, whatever that radius might be. See Beck, 49 Crim. L. Bull. at 645. Indeed, the only purpose for presenting CSLI at trial is to provide the jury with evidence about the general location of a pertinent cell phone at a particular time. That is what makes CSLI admissible as relevant evidence under N.J.R.E.

401. The fact that CSLI can tend to show that a phone was in a particular general area during a time period relevant to the case is the very reason the State presented such evidence in the first instance. There is no logical purpose to allow CSLI testimony only to then tell the jury that they are not permitted to use the evidence to determine the location of a phone.

A jury, properly informed about the intricacies and nuances of cell towers, should be able to use CSLI to place a phone in a general area. But that cannot happen if a jury is not properly equipped with the tools necessary to understand this relevant evidence. 44 Further, leaving the jury to draw any inferences it deemed appropriate from the non-contextualized CSLI evidence -- without a full explanation of its technical aspects and capabilities by an expert witness -- also risked confusing and misleading the jury in violation of N.J.R.E.

403. The State argued that any layperson, including members of the jury, can determine and plot locations of cell towers by using the towers’ longitude and latitude provided in the records and inputting those numbers into an internet mapping application.

Although a jury may be able to figure out the location of cell towers using phone records, it would not be able to draw any meaningful inferences from that information without an understanding of how cell towers operate and why those cell tower locations matter. And, in the absence of expert guidance, a jury could attribute more or less weight to the tower locations than is warranted.

As noted, many jurisdictions allow witnesses to provide limited testimony about the locations of cell phone towers that cell phones connect to without the testifying witness being qualified as an expert. We disagree with that approach.

The relevance of CSLI can be understood by a jury only when it has a better grasp of how cell towers and cell phones interact. This requires an understanding of cell tower sectors, direction, and maximum coverage range, and the many factors, such as terrain and topography, that impact whether a cell phone connects to the closest tower or to one that is farther away.

The technical and specialized knowledge required to interpret CSLI is beyond the ken of the average juror. Therefore, CSLI evidence must be presented by an expert witness. Testimony that simply communicates the cell tower locations to the jury without an expert witness explaining the significance of those locations is similar to the brake pad and brake fluid testimony in *Wyatt*, 217 N.J.

Super. at 591-92, and the lay testimony regarding airbag deployment in *Taing*, 454 N.J. Super. at 469-71. The *Wyatt* and *Taing* courts required expert witnesses to connect those facts to the issues of consequence in those cases.

In this case, merely providing cell tower locations -- without any information about the range of those towers or how the towers technologically interact with cell phones -- did not help the jury understand where defendant's phone was potentially located during the relevant time period. More troubling still, the limited CSLI evidence presented violated the trial court's order and led to improper arguments in summation by the State.

N.J.R.E. 403 requires exclusion of such testimony, which could lead a jury to make impermissible inferences, resulting in confusion. Finally, the CSLI testimony that the jury heard in this case, in the form of testimony and the State's closing argument, is at odds with our holding in *Burney*.

In that case, we held that an FBI special agent's testimony regarding the range of a particular cell tower was an impermissible net opinion because it was based on nothing more than the agent's own "rule of thumb" and not on scientific or technical data. 255 N.J. at 5, 25.

Here, Detective Leyman told the jury that phone records indicated where a person may have been located at the time of Lopez's death -- a conclusion that Detective Leyman did not support with technical data. In summation, the State then relied on Detective Leyman's testimony to assert that

a phone must be “a stone’s throw” from the tower it connects to, and thus that defendant’s phone was “clearly moving” with the victim.

If an expert attempted to offer the same conclusory information that Detective Leyman did, that expert’s testimony would constitute an impermissible net opinion in violation of N.J.R.E. 703 because the conclusions were unsupported by adequate data.

The State cannot circumvent the standards to which expert testimony is held under N.J.R.E. 702 by presenting the testimony through a lay witness rather than an expert. As gatekeepers of the evidence, trial courts must ensure that relevant evidence properly goes before the jury in a manner that assists the jury.

In order to understand CSLI, which is beyond the ken of the average juror, an expert witness must be called to testify. Here, admission -- over repeated objections -- of the CSLI testimony was a clear error, see *Garcia*, 245 N.J. at 430, that was not cured by the limiting instructions given. 47 V. For the foregoing reasons, we affirm the Appellate Division’s judgment.

CHIEF JUSTICE RABNER and JUSTICES PATTERSON, WAINER APTER, FASCIALE, NORIEGA, and HOFFMAN join in JUSTICE PIERRE- LOUIS’s opinion. 48