



- CCSI PIM testing and RF Site optimization solution includes PIM testing of all identified passive components and RF paths, recommendations for remediation of any identified PIM failures, implementation of approved remediation and complete documentation of all testing and remediation performed.
- All replaced cabling or components will be retested for PIM and additionally a sweep insertion loss test will be performed.
- All of CCSI testing results will include a copy of the technician certification for the test equipment, test equipment verification and calibration measurements and individual component or RF path test measurements compared against the customers identified PIM and sweep acceptance criteria for that component or system of components.
- CCSI technicians are certified on the latest PIM test equipment and bring to each site the combined expertise of PIM testing on tens of thousands of cell sites and DAS systems.
- When required to provide replacement of a component as part of PIM remediation CCSI technicians can leverage our regional warehouse resources which enables us to keep inventory of equipment close to the work site.
- CCSI technical resources provide expertise throughout the project from RF engineering, through ground and tower testing and optimization.
- Industry leading project management support provides reporting on key milestones and project completion.
- Ability to quickly deploy multiple crews of experienced tower technicians and engineers provides quick ramp up on our customer's critical projects.
- Best in class closeout documentation includes all required test results and robust photo documentation of installed equipment as well data upload to the customers selected repository.
- At CCSI safety, quality and on-time delivery are our top priorities and all of our processes procedures are designed with these metrics in mind allowing us to deploy quickly, accurately and safely.
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- CCSI has vast experience with the equipment supplied by all of the major radio and antenna manufacturers ensuring that multi-vendor solutions are tested and optimized accurately.



Overview

CCI Services (CCSI) Passive Inter-modulation (PIM) testing and RF Optimization Solution leverages CCSI's years of experience in PIM testing on over ten thousand of sites. In addition to PIM testing passive components and RF paths, we will leverage our expertise to recommend steps to eliminate the sources of PIM interference.

CCI can provide corrective actions onsite to bring the site up to optimal performance. Often the cause of the PIM is a bad connector or jumper and by replacing these bad elements the PIM can be remediated. Other times passive devices such as antennas, duplexer or bias-Ts can be the cause of the PIM. CCI can also isolate the problem to devices such as Power Amplifiers, Filters and Radios.

Recommended remediation can include :

- Replacing connectors on hard lines or jumpers.
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- Swapping out and re-commissioning equipment such as filters, radios, TMAs or power amplifiers that prove to cause PIM.
- Identifying and replacing other possible sources such as Bias-Ts and Lightning Arrestors
- Identifying outside sources contributing to PIM.

All testing is performed by CCI's team of experienced and certified RF Technicians trained in cable and antenna system testing. Our technicians are equipped with state of the art equipment that enables them perform testing quickly and effectively. This allows for multiple tests to be performed simultaneously and lowers cost considerably.

CCSI is capable of providing test and remediation services throughout North America. CCSI continues to provide both national and regional services supporting several of the major carriers for their 3G and 4G rollouts. We've become a trusted partner and CCSI can always be expected to deliver high quality services, safely and on time.



Deliverables

- PIM testing of base and tower top components including feeder lines, RF jumpers, antennas and other passive components and systems as required by the scope of the project.
- Complete PIM test results compared against the customer PIM acceptance criteria.
- Recommendations for remediation of failed components.
- When approved, replacement of failed components.
- CCSI will retest for PIM and sweep for insertion loss all replacement components, lines and affected RF paths.
- Dedicated project and construction managers provide timely progress reporting and project tracking.
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- Comprehensive closeout documentation includes all test results and complete photo documentation of installed equipment and includes digital upload services.
- As needed RF engineering a troubleshooting expertise