

CLAIMS

1. An interference detection system in a point-to-point radio system, the point-to-point radio system including a first site in radio communication with a second site, comprising:
 - at least one processor; and
 - memory storing computer instructions, the computer instructions when executed by the at least one processor causing the system to perform,
 - gathering a temporal snapshot of radio parameter values associated with at least a first site of a point-to-point radio system, the radio parameter values including at least a receive signal level (RSL) value and at least one other radio parameter value correlated with signal degradation during the temporal snapshot;
 - determining whether the RSL value is greater than an RSL threshold;
 - determining whether the other radio parameter value indicates a threshold level of signal degradation during the temporal snapshot;
 - at least when the RSL is greater than the RSL threshold and the other parameter indicates a threshold level of signal degradation during the temporal snapshot, then determining that external interference is likely present during the temporal snapshot;
 - at least when the RSL is not greater than the RSL threshold, then determining that the external interference is likely not present during the temporal snapshot; and
 - performing a responsive action to a determination of the external interference being likely present during the temporal snapshot.
2. The interference detection system of claim 1, wherein the radio parameter values include radio parameter values associated with a modem and a radio frequency unit at the first site during the temporal snapshot.
3. The interference detection system of claim 1, wherein the other radio parameter value includes a Demodulator Not Locked (DNL) Alarm, and wherein the other radio parameter value indicates a threshold level of signal degradation at least when the DNL Alarm is active.
4. The interference detection system of claim 1, wherein the other radio parameter value includes Errored Seconds (ES) or Severely Errored Seconds (SES) value, and wherein the other radio parameter value indicates a threshold level of signal degradation at least when the ES or SES value is increasing from a previous sample.

5. The interference detection system of claim 1, wherein the other radio parameter value includes a signal-to-noise ratio (SNR) value, and wherein the other radio parameter value indicates a threshold level of signal degradation at least when at least the SNR value is less than a threshold.
6. The interference detection system of claim 1, wherein the other radio parameter value includes a change in an Uncoded Bit Error Rate (U-BER), and wherein the other radio parameter value indicates a threshold level of signal degradation at least when the change in the U-BER is greater than a threshold.
7. The interference detection system of claim 1, wherein the other radio parameter includes Adaptive Code Modulation (ACM) data, and wherein the other radio parameter value indicates a threshold level of signal degradation at least when ACM is active and negative.
8. The interference detection system of claim 1, wherein the other radio parameter value includes Automatic Transmit Power Control (ATPC) data, and wherein the other radio parameter value indicates a threshold level of signal degradation at least when ATPC is enabled and a power adjustment is greater than a threshold.
9. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
 - evaluating interference persistence; and
 - determining a false positive at least when the interference persistence is less than a minimum threshold duration.
10. The interference detection system of claim 9, wherein the computer instructions when executed by the processor further cause the system to perform
 - determining an amount of interference variation;
 - identifying the external interference as a steady interferer at least when the amount of interference variation is less than a threshold; and
 - identifying the external interference as a continuous bursty interferer at least when the amount of interference variation is greater than the threshold.

11. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
 - determining first interference effects on a first receiver at the first site in space diversity with a second receiver at the first site;
 - determining second interference effects on the second receiver at the first site;
 - comparing the first interference effects with the second interference effects; and
 - at least when the first interference effects are substantially the same as the second interference effects, then validating the external interference.
12. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
 - determining first SNR on a first receiver at the first site in space diversity with a second receiver at the first site;
 - determining second SNR on the second receiver; and
 - at least when the first SNR indicates signal degradation while the second SNR does not indicate signal degradation and when thereafter the first SNR improves or clears while the second SNR deteriorates, then identifying the external interference as a likely multipath interference.
13. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
 - comparing a near-end interference condition with a far-end interference condition; and
 - at least when the near-end interference condition is not substantially similar to the far-end interference condition, then validating the external interference.
14. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
 - searching a historical database for records indicative of an interference pattern or correlation with external events; and
 - using the interference pattern or correlation with external events to assist in identifying future interferences as not being due to an external interferer.

15. The interference detection system of claim 1, wherein the computer instructions when executed by the processor further cause the system to perform
- gathering a bin of radio parameter information, the bin of radio parameter information including maximum and minimum levels of RSL values and at least one other radio parameter values occurring during a specific time period; and
 - evaluating the bin of radio parameter information to determine a likelihood of the external interference occurring in any temporal snapshot within the specific time period, before performing an analysis of any temporal snapshot of radio parameter values within the specific time period.
16. The interference detection system of claim 1, wherein the specific time period includes a 15-minute time period.
17. An interference detection method in a point-to-point radio system, the point-to-point radio system including a first site in radio communication with a second site, comprising:
- gathering a temporal snapshot of radio parameter values associated with at least a first site of a point-to-point radio system, the radio parameter values including at least a receive signal level (RSL) value and at least one other radio parameter value correlated with signal degradation during the temporal snapshot;
 - determining whether the RSL value is greater than an RSL threshold;
 - determining whether the other radio parameter value indicates a threshold level of signal degradation during the temporal snapshot;
 - at least when the RSL is greater than the RSL threshold and the other parameter indicates a threshold level of signal degradation during the temporal snapshot, then determining that external interference is likely present during the temporal snapshot;
 - at least when the RSL is not greater than the RSL threshold, then determining that the external interference is likely not present during the temporal snapshot; and
 - performing a responsive action to a determination of the external interference being likely present during the temporal snapshot.
18. The interference detection method of claim 17, further comprising
- evaluating interference persistence; and

determining a false positive at least when the interference persistence is less than a minimum threshold duration.

19. The interference detection method of claim 18, further comprising
determining an amount of interference variation;
identifying the external interference as a steady interferer at least when the amount of interference variation is less than a threshold; and
identifying the external interference as a continuous bursty interferer at least when the amount of interference variation is greater than the threshold.
20. The interference detection method of claim 17, further comprising
determining first interference effects on a first receiver at the first site in space diversity with a second receiver at the first site;
determining second interference effects on the second receiver at the first site;
comparing the first interference effects with the second interference effects; and
at least when the first interference effects are substantially the same as the second interference effects, then validating the external interference.
21. The interference detection method of claim 17, further comprising
determining first SNR on a first receiver at the first site in space diversity with a second receiver at the first site;
determining second SNR on the second receiver; and
at least when the first SNR indicates signal degradation while the second SNR does not indicate signal degradation and when thereafter the first SNR improves or clears while the second SNR deteriorates, then identifying the external interference as a likely multipath interference.
22. The interference detection method of claim 17, further comprising
comparing a near-end interference condition with a far-end interference condition; and
at least when the near-end interference condition is not substantially similar to the far-end interference condition, the validating the external interference.

23. The interference detection method of claim 17, further comprising
searching a historical database for records indicative of an interference pattern or correlation with external events; and
using the interference pattern or correlation with external events to assist in identifying future interferences as not being due to an external interferer.
24. The interference detection method of claim 17, further comprising
gathering a bin of radio parameter information, the bin of radio parameter information including maximum and minimum levels of RSL values and at least one other radio parameter values occurring during a specific time period; and
evaluating the bin of radio parameter information to determine a likelihood of the external interference occurring in any temporal snapshot within the specific time period, before performing an analysis of any temporal snapshot of radio parameter values within the specific time period.