Pseudorandom Noise Sliding Correlator Channel Sounder

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ISART Workshop on Best Measurement Practices
July 26, 2018

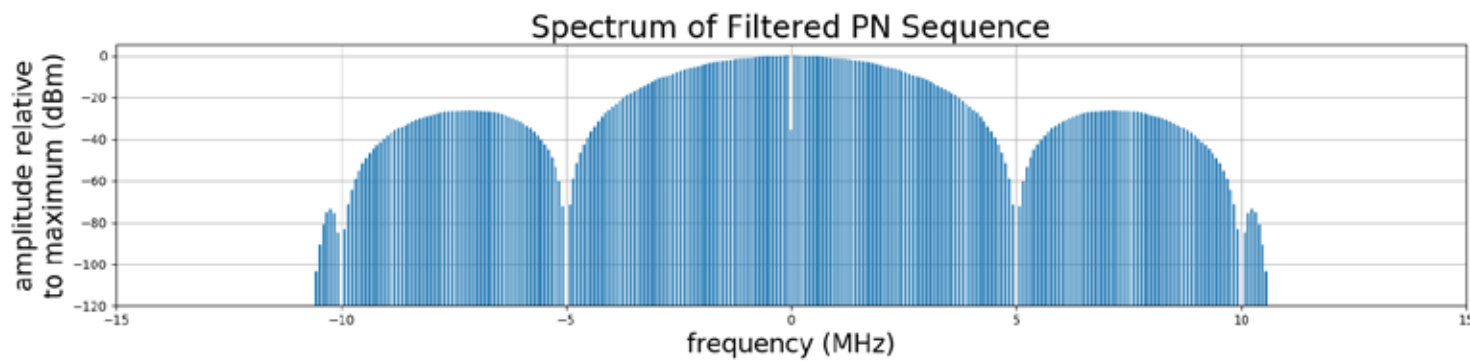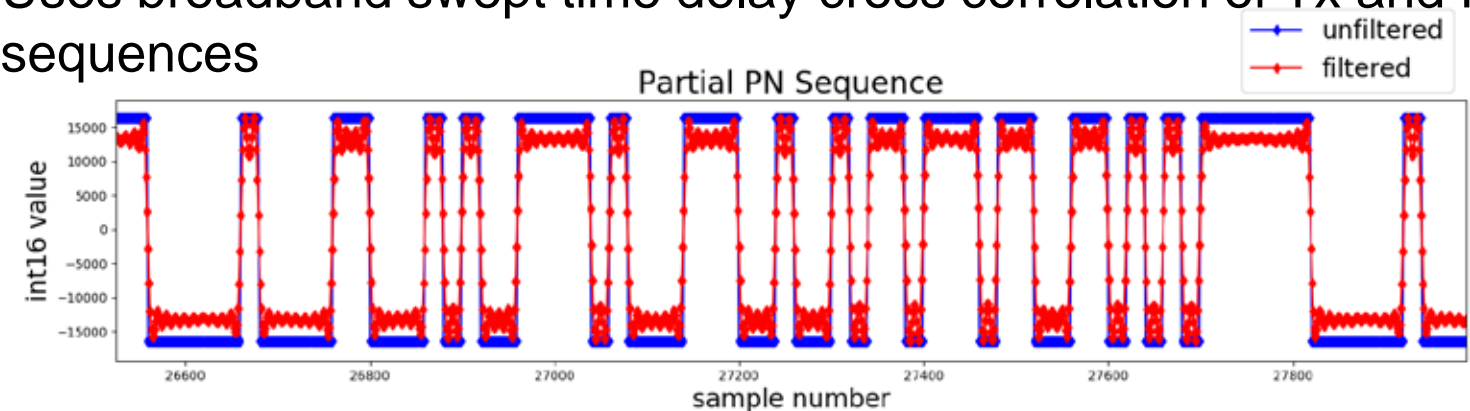Institute for Telecommunication Sciences (NTIA/ITS)
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ITS

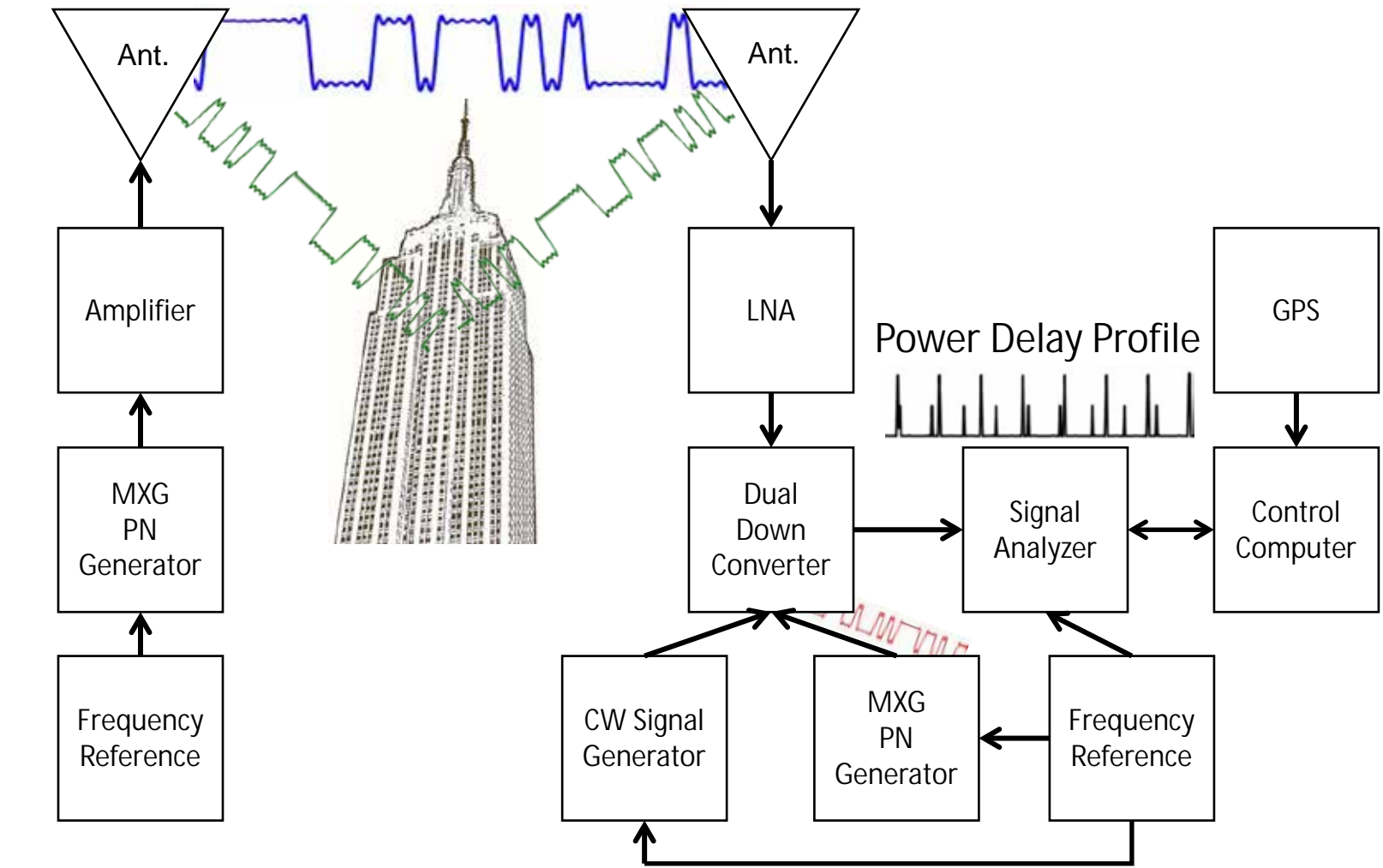# What is a PN Sliding Correlator?

- RF measurement system that probes the channel impulse response
- Uses a Pseudorandom Noise (PN) sequence
  (Binary Phase Shift Keyed (BPSK) modulated on carrier frequency)
- Uses broadband swept time delay cross correlation of Tx and Rx PN sequences

PN Channel Sounder Implementation

Transmitter

Receiver

Ant.

Ant.

Amplifier

MXG
PN
Generator

Frequency
Reference

LNA

Power Delay Profile

GPS

Dual
Down
Converter

Signal
Analyzer

Control
Computer

CW Signal
Generator

MXG
PN
Generator

Frequency
Reference

Simulation of PN Sliding Correlator

Power Delay Profile (black = correlation(red, blue+green)

Legend:
- rx PN signal
- 1st received signal
- 2nd received signal

PN Sequences
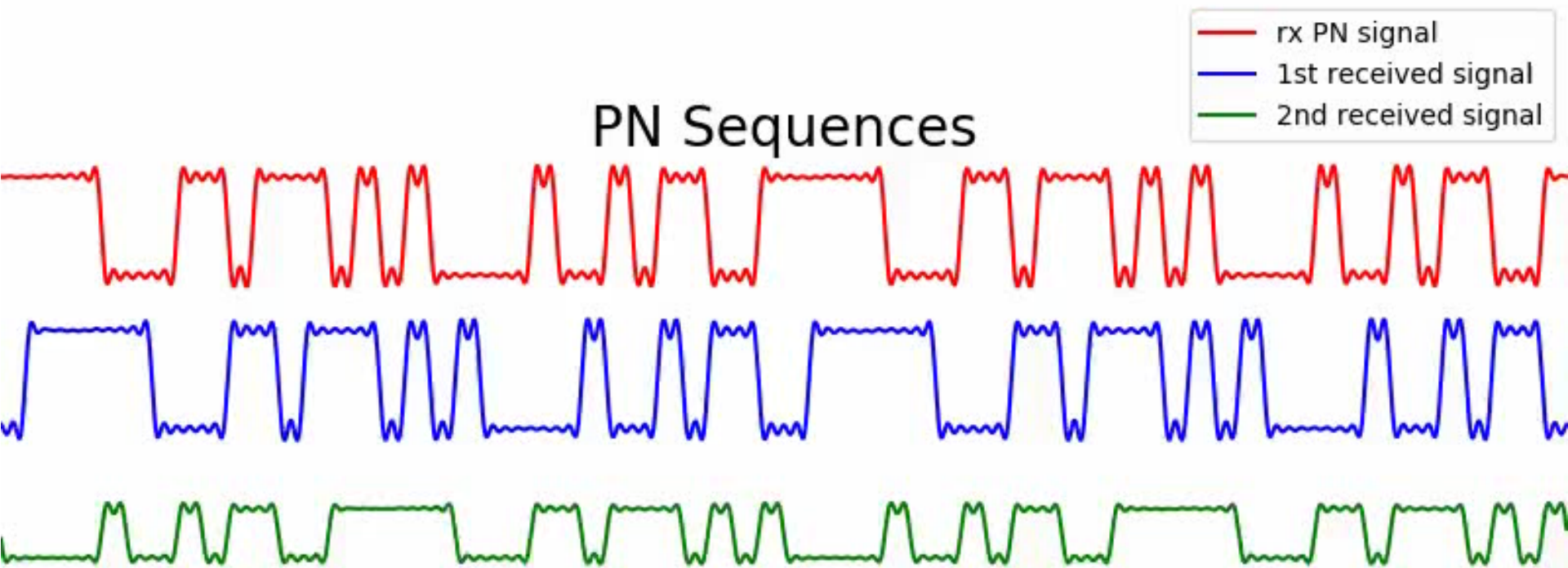
PN Sliding Correlator Advantages

- Real time implementation of classical PN channel sounder

- Lower data rate and volume than classical PN channel sounder

- Simpler post-processing reduction

- Variable parameters to adjust to measurement environment

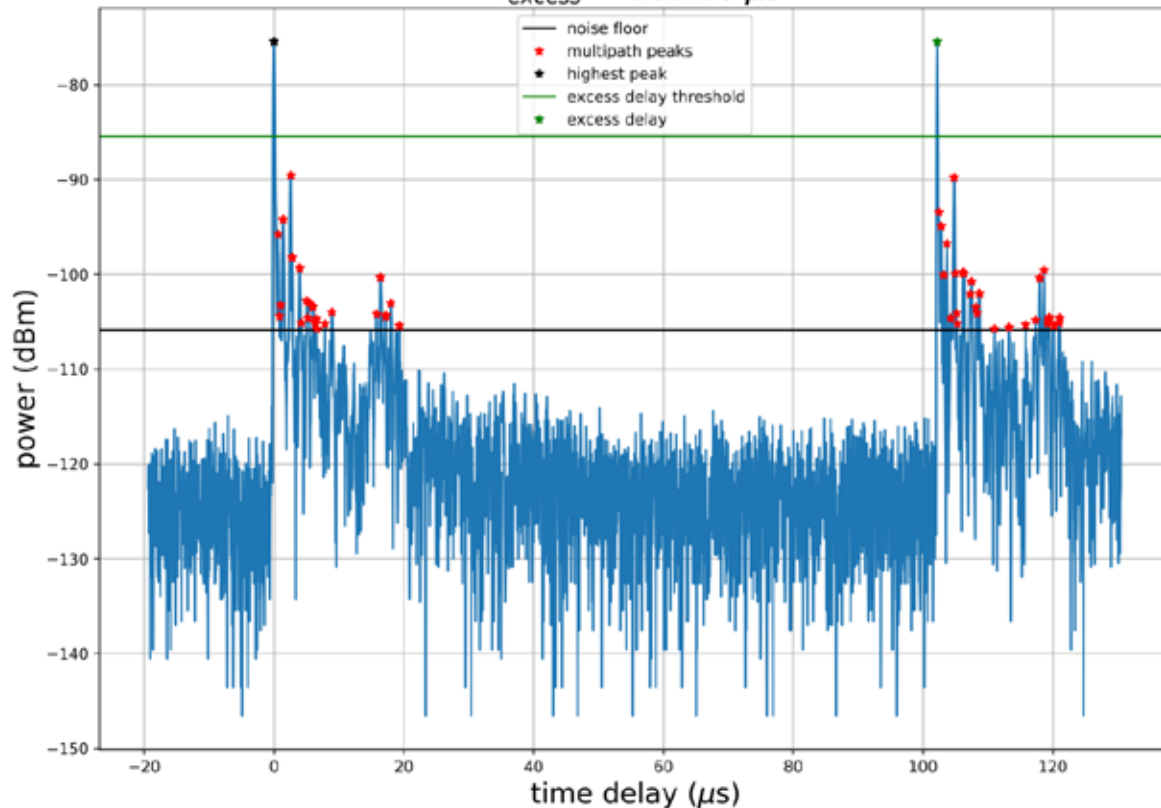- Allows for the identification and visualization of multipath components

APDP Multipath Statistics
Path Gain = -126.40 dB
$\bar{\tau} = 51.89 \ \mu s$
$\sigma_\tau = 51.18 \ \mu s$
$\tau_{excess} = 102.20 \ \mu s$

Legend:
— noise floor
★ multipath peaks
★ highest peak
— excess delay threshold
★ excess delay

PN Sliding Correlator in Use