Understanding Interference Effect in Communication Systems

a) Noise effect

The objective of this part is to understand noise (AWGN) effect on the receiver.

Following items can be observed:
- Constellation diagram and EVM with various levels of transmitted power
- BER vs. SNR

b) Interference analysis

Interference can be categorized in terms of:

- Band relative to the message signal: in/out of band (usually called: adjacent-channel/co-channel interference ACI/CCI),
- Interference intention: intentional/non-intentional interference,
- Bandwidth relative to message bandwidth: narrow/large band interference,

Possible tests are:

- Multiple ESG generate co-channel and ACI with various power levels. The analyzer observes the system parameters and effect of interference in the system while varying different parameters (e.g. interference BW (symbol rate, and roll-off factor), interference carrier, interference power)
- Near/far problem (CDMA)
- Generate an interference (it could be standard or non-standard signal; could be tone, pulses, noise-like signal) and observe BER Vs. CINR
- Observe interference mitigation technique such as CSMA in WLAN, or Freq. hopping in Bluetooth
- Investigate the usefulness of analog filters in cancelling interference effects. Implement digital filtering (in Matlab environment) on the recorded signals with interference
- Investigate Spread Spectrum immunity to interference