Evaluating Uncertainty in Vector Network Analyser Measurements

# Introduction

# Sources of VNA Measurement Uncertainty

## Calibration Standards

## Sources of Random Error

## Additional Sources

# Software Frameworks for VNA Uncertainty Evaluation

Cal equations quite large so software typically used to propagate VNA uncertainty.

## Standalone Vendor Tools

## Keysight PNA-X Dynamic S-Parameter Uncertainty Option

## METAS VNA Tools II

## NIST Microwave Uncertainty Framework

# Sources of NVNA Measurement Uncertainty

Reference state of the art.

## Absolute Power Calibration

*Power meter study?*

## Absolute Phase Calibration

*NIST phase reference characterisation*

# Evaluation of Uncertainty in MHVNA Measurements

## Measurement Models

Blockley paper etc, jacobians for

## Input Quantities

## Processing Structure

## Results

# Conclusions