
Bird®

What will you get from this class?

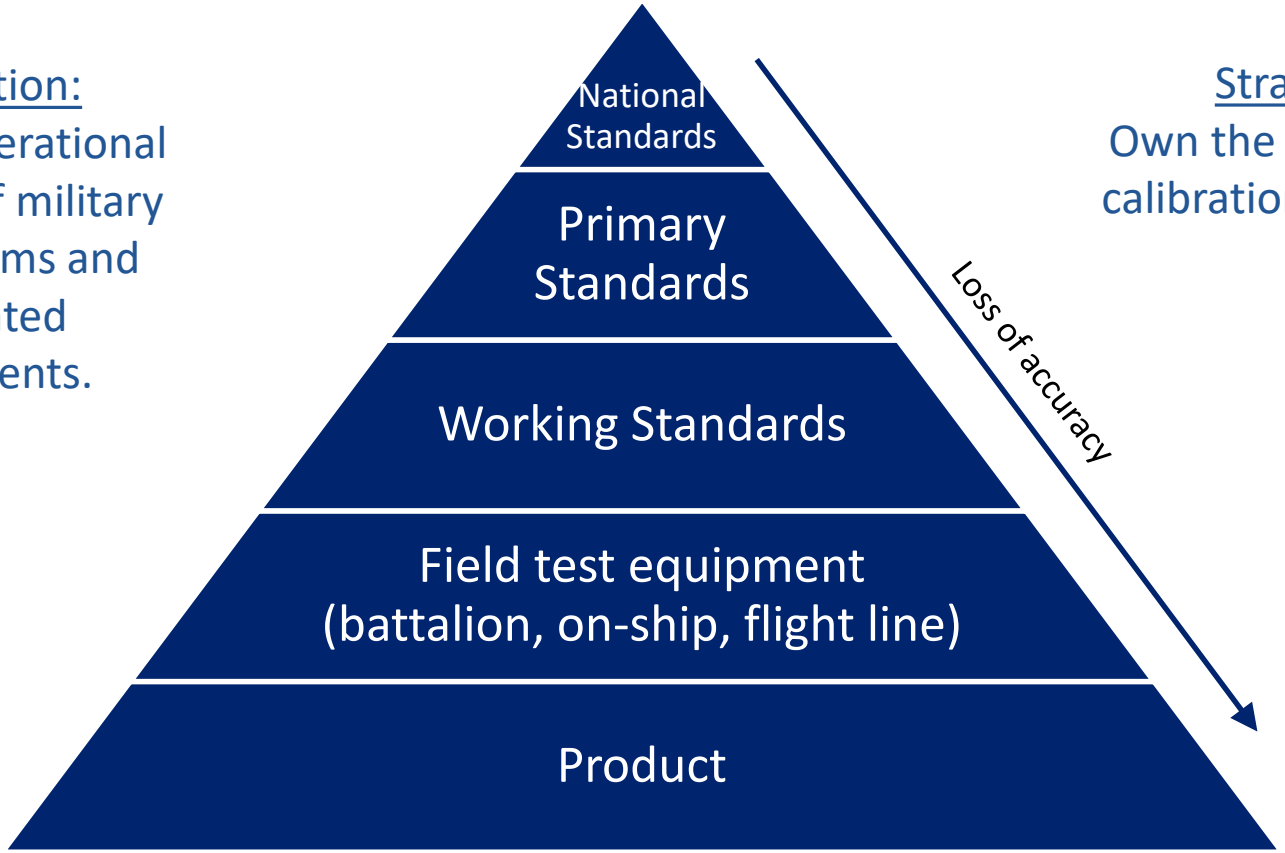
Class description

*Bird's new wideband **Sensor Metrology Kit** helps users quickly calibrate RF equipment in the field or metrology lab. Learn how this solution simplifies the calibration process, decreases time-to-calibration and cost of ownership.*

- Application Overview
- Who are the customers?
- What are user's pain points?
- Product Overview
- Competition
- Key Questions to Ask
- Sales Tools

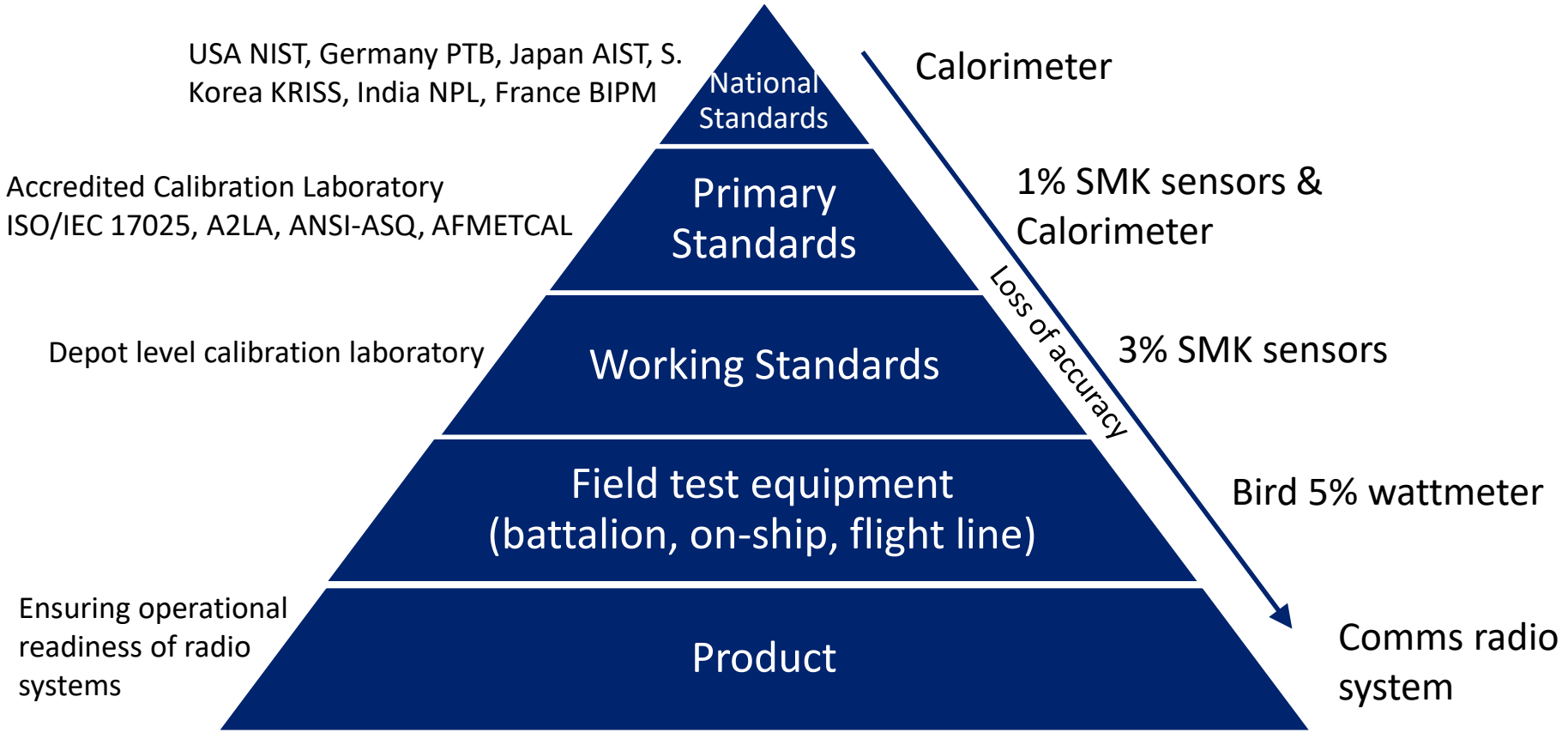
What is the Application?

Application:
Ensuring operational readiness of military radio systems and associated components.



Strategy:
Own the military RF calibration workflow

Who are the customers?



Key Target Customer Segments

Military Branches

Worldwide military branches that have metrology or calibration labs and/or have field calibration.

- Air Force
- Navy
- Army
- Marines
- Coast Guard

Prime Contractors

Contractors that are serve the military and have calibration labs are also a key target market.

- Northrup Grumman
- BAE
- Boeing
- Others

Persona – 3% SMK

Name: Taylor, enlisted military, Navy
Segment: Field Precision Measurement
Age: 23 years old
Education: High School
Objective: test & calibrate measurement and diagnostic equipment for conformance to standards. Ensure reliable, safe and accurate equipment is available when needed by everyone on ship/base.

“If it takes a measurement, we calibrate the equipment. Attention to detail is pivotal, we cannot make mistakes. We are literally allowed zero errors. One mistake could mean the difference between a guided weapons system firing on target or missing by several feet"

Persona – 1% SMK

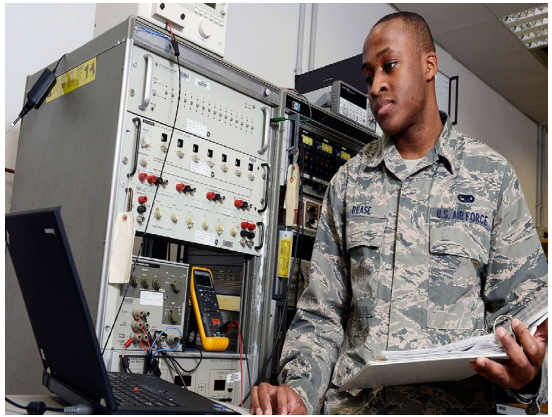
Name: Ryan, civilian contractor, Air Force
Segment: Precision Metrology Lab
Age: 34 years old

Education: BS Engineering or Physics

Objective: Ensure instrumentation conforms to standards.

"Calibration is a maintenance action that is required to ensure instrumentation supporting Air Force systems is accurate and can reliably perform its mission. Without calibration maintenance, we would be putting our warfighters in harm's way and our nation at risk."

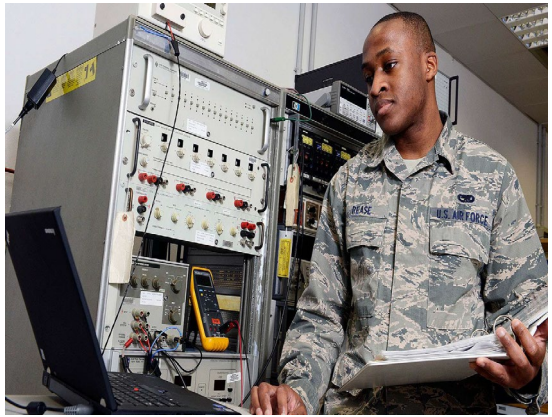
Persona – Pain Points



Pain Points:

- Having to support and calibrate 5,200 different types of equipment requires that the calibration equipment is:
  - Easy to use
  - Works flawlessly, reliably & repeatably
  - Zero mistakes when interpreting the results

Persona – Pain Points



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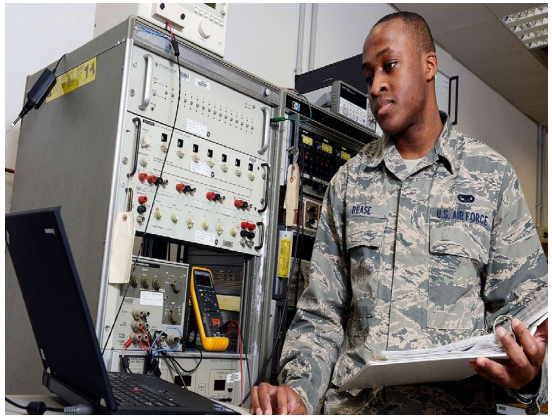

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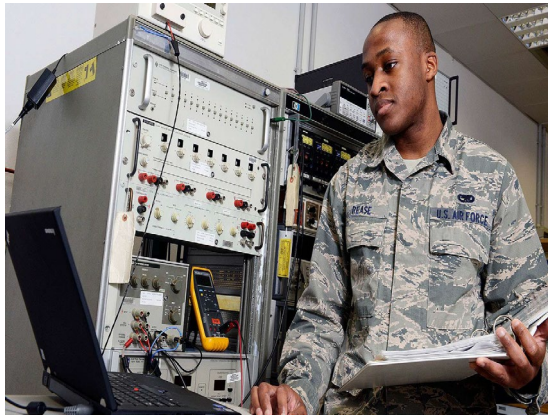

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- When the user interface is not easily understood, this impacts the time it takes to set up the test and inserts doubt into the results.
- Meet or exceed the sustained equipment availability standard of 95%. This means that we work in a **production environment**, but the work is meticulous and painstakingly slow.

SMK Value Proposition

For the military electronics technician or calibration engineer who checks conformance to RF standards and performs calibration services, we provide a precision, wideband metrology kit that calibrates RF products in the field or metrology lab.

Unlike other T&M companies, who provide expensive test sets, attenuators or sensitive directional coupler + power sensor solutions, Bird provides a 100X faster time-to-calibration solution, covering a wide frequency range, with reduced cost of ownership that offers lab precision, in the field, at a competitive price.

SMK Value Proposition

SMK achieves its value proposition by delivering the following capabilities:

1. Each kit covers a frequency range of 1 MHz to 1 GHz with only three sensors. This enables the end user to minimize the number of reference standards in use which, reduces cost of ownership.
2. Additional field calibration of the kits are not required unlike other competitive solutions.
3. Intuitive, uncomplicated display of RF measurements using the 4421 Power Meter enables calibration with confidence.

Sensor Metrology Kit (SMK)

Two kits: 1% and 3% kits

Kit Model #	Sensors Included	Frequency Range
SMK-3001	SMK-3001-LB	1 to 10 MHz
1% kit	SMK-3001-MB	10 to 100 MHz
	SMK-3001-HB	100 to 1000 MHz
SMK-3003	SMK-3003-LB	1 to 10 MHz
3% kit	SMK-3003-MB	10 to 100 MHz
	SMK-3003-HB	100 to 1000 MHz

Sensor Metrology Kit (SMK)

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Kit Model #	Sensors Included	Frequency Range	Accuracy	Power Range
SMK-3001	SMK-3001-LB	1 to 10 MHz	+/- 1% of reading (2σ)	80 to 107 W
1% kit	SMK-3001-MB	10 to 100 MHz		
	SMK-3001-HB	100 to 1000 MHz		
SMK-3003	SMK-3003-LB	1 to 10 MHz	+/- 3% of reading (2σ)	1 to 1000 W
3% kit	SMK-3003-MB	10 to 100 MHz		
	SMK-3003-HB	100 to 1000 MHz		

Sensor Metrology Kit (SMK)

Each kit includes 4421A, carrying case, latch-n-lock cable

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SMK-3003	SMK-3003-LB	1 to 10 MHz	+/- 3% of reading (2σ)	1 to 1000 W
3% kit	SMK-3003-MB	10 to 100 MHz		
	SMK-3003-HB	100 to 1000 MHz		

Sensor Metrology Kit (SMK)

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Kit Model #	Sensors Included	Frequency Range	Accuracy	Power Range	Pricing
SMK-3001	SMK-3001-LB	1 to 10 MHz	+/- 1% of reading (2σ)	80 to 107 W	$18,850
1% kit	SMK-3001-MB	10 to 100 MHz			
	SMK-3001-HB	100 to 1000 MHz			
SMK-3003	SMK-3003-LB	1 to 10 MHz	+/- 3% of reading (2σ)	1 to 1000 W	$12,850
3% kit	SMK-3003-MB	10 to 100 MHz			
	SMK-3003-HB	100 to 1000 MHz			

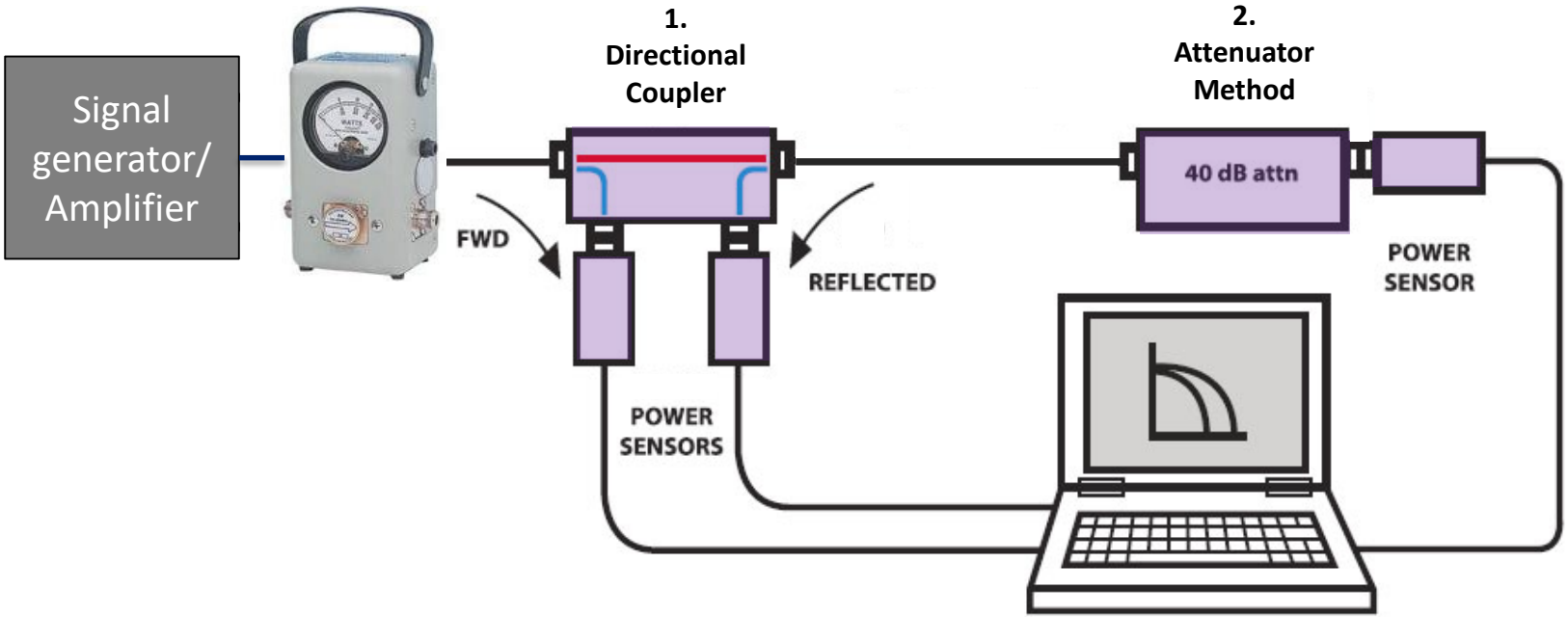
Calibration of “Product”

Multi-band military radio communication system

Wattmeter

Dummy load or antenna

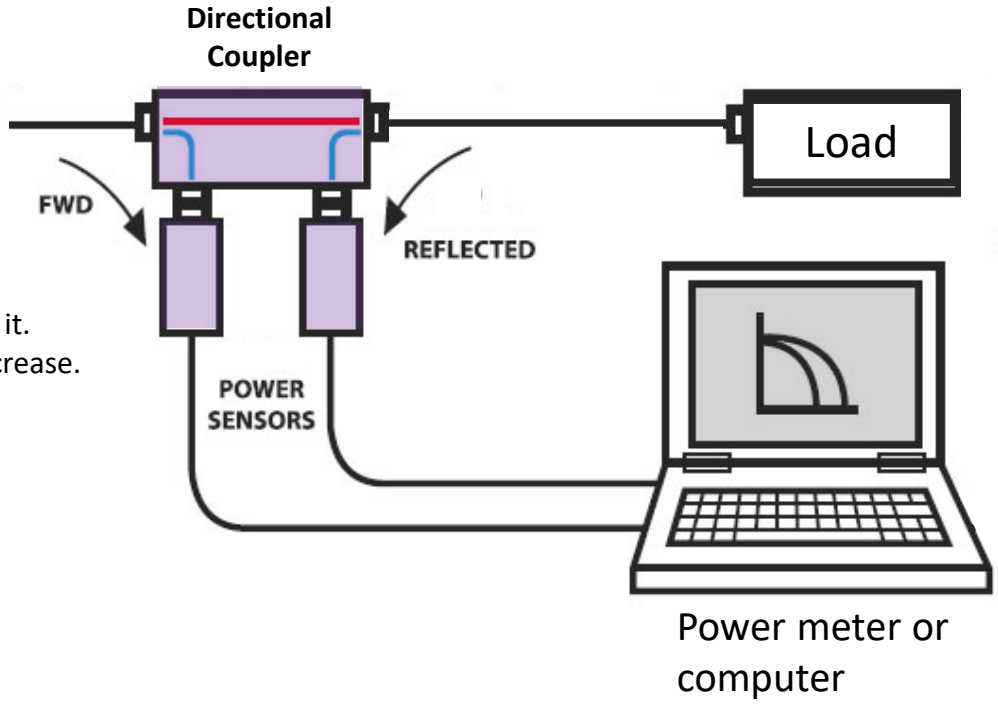
Competitive Solutions

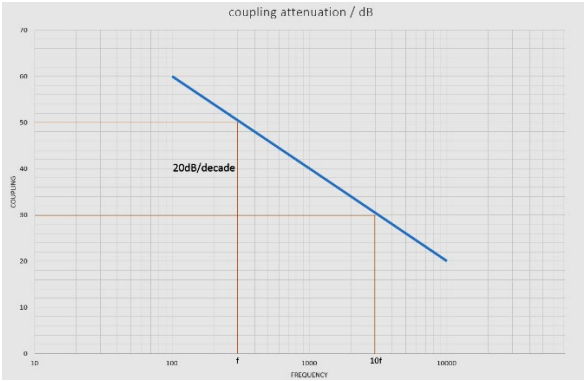


Directional Coupler Method

Sources of error:

1. Directional coupler coefficients must be determined at calibration frequencies and power levels
2. Power sensors must be calibrated for frequencies & power levels of interest
3. Significant measurement errors can occur due to reflections that occur between the coupler and the devices connected to it.
4. No temperature correction. Important as power levels increase.

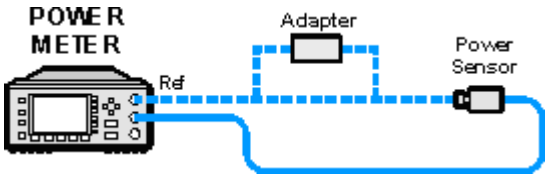




Calibration of Directional Coupler

1. Calibrate Power Meter

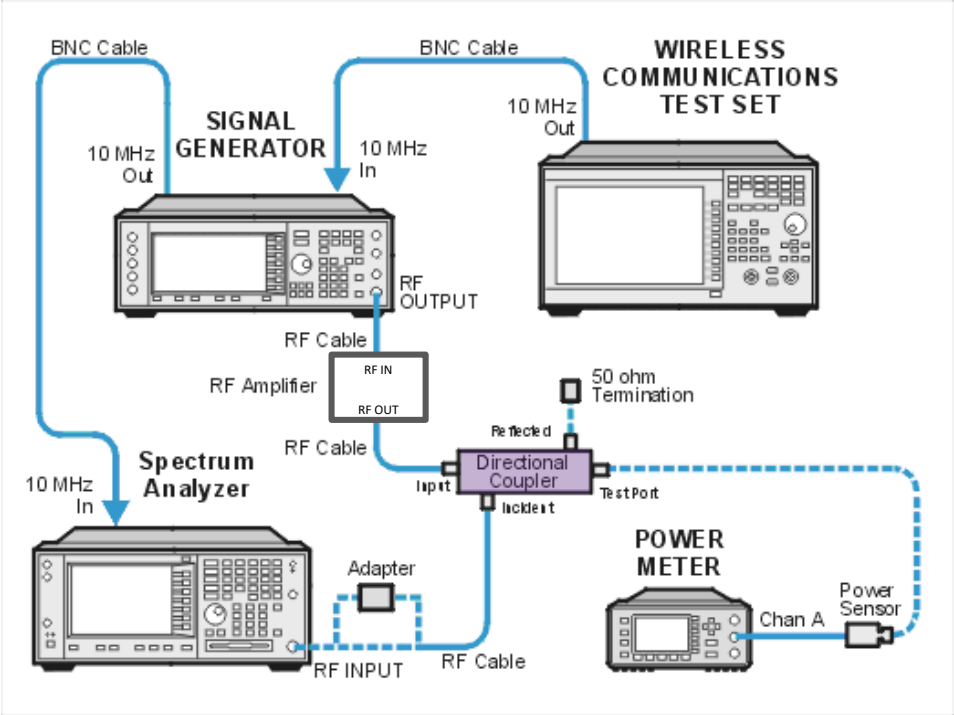
- Power meter is used to set a reference of the absolute power level at the device under test for a given reading on the spectrum analyzer.



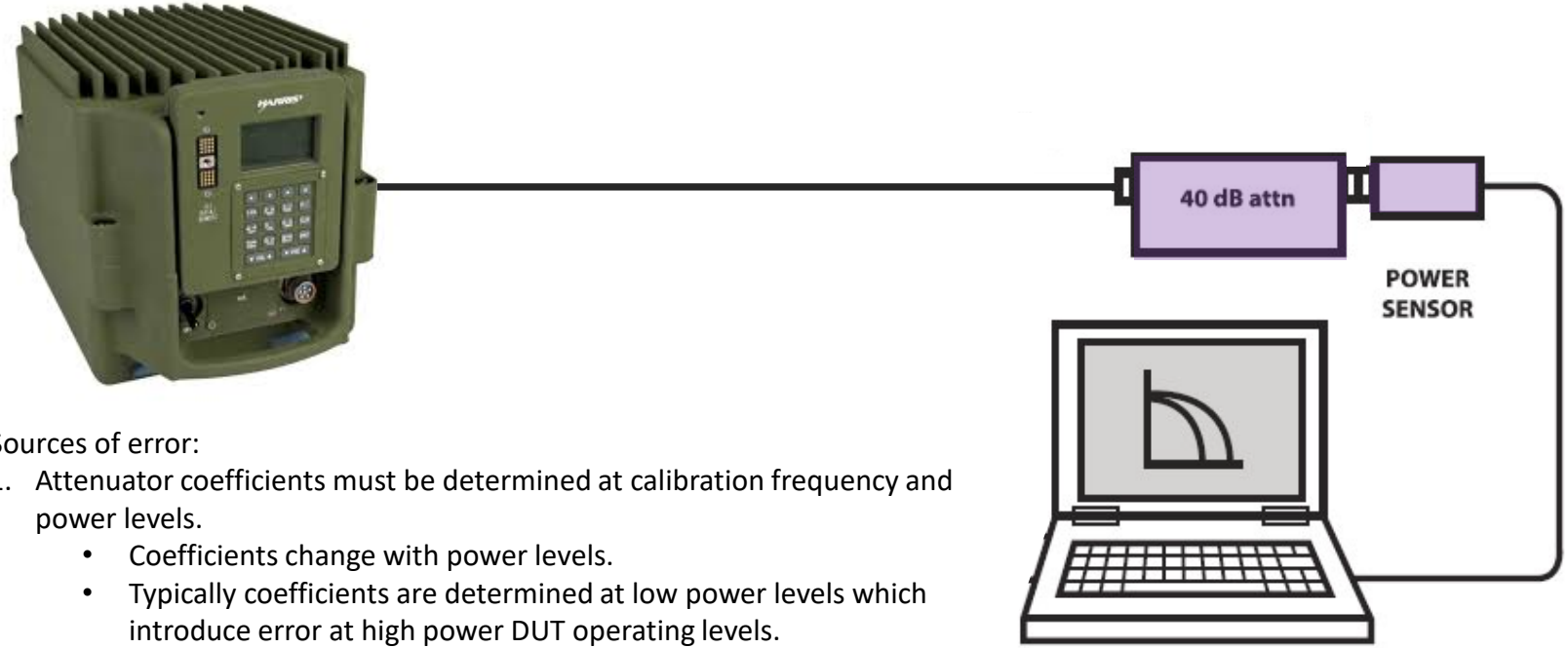
2. Calibrate Directional Coupler

- This test collects coupler calibration coefficients.
- Coefficients must then be applied to final power measurement.
- According to Keysight, the calibration data is valid for 90 minutes

Directional coupler calibration test setup



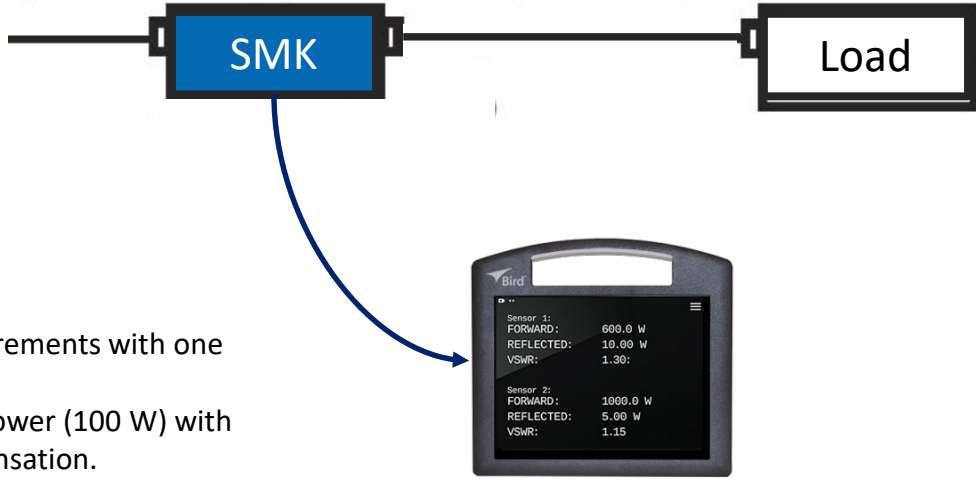
Two Competitive Solutions



Sources of error:

1. Attenuator coefficients must be determined at calibration frequency and power levels.
    - Coefficients change with power levels.
    - Typically coefficients are determined at low power levels which introduce error at high power DUT operating levels.
2. Power sensors must be calibrated for frequency & power level of interest.
3. No temperature correction. Important as power levels increase. Look for attenuator that has a low temperature coefficient to control attenuation drift.

SMK Solution



1. Forward & Reflected measurements with one sensor
2. Sensors calibrated at high power (100 W) with built-in temperature compensation.
3. Characterization of internal directional coupler embedded into sensor

Why not sell existing Bird sensors?

- CW and digital signal types are supported
- Only sensors that support +/-1% accuracy across a wide bandwidth

Frequency Range	Model	Accuracy	Power Range	Modulation Type
1.5 to 32 MHz	4021	+/- 3% of reading	300 mW to 1000 W	CW only
25 MHz to 1 GHz	4022			
1 to 10 MHz	SMK-3003-LB	+/- 3% of reading	1 to 1000 W	CW, Digital
10 to 100 MHz	SMK-3003-MB			
100 to 1 GHz	SMK-3003-HB			
1 to 10 MHz	SMK-3001-LB	+/- 1% of reading	80 to 107 W	CW, Digital
10 to 100 MHz	SMK-3001-MB			
100 to 1 GHz	SMK-3001-HB			

Questions to Ask

1. How are you currently calibrating your RF equipment (what method)?
2. Are you measuring CW or digital signals?
3. What is it about your system that you like and don't like?
4. How confident are you in the results?
5. Frequency range, power levels?

Where to go & not go

Bird
The RF Experts

Where to go

- **Military calibration labs**
- **Commercial Research & Development departments** – perhaps a lower cost alternative to sending equipment out to a commercial cal lab
- **University Research Labs** – maybe

Where not to go

- **Commercial test labs** – not a primary target since already equipped with calibration equipment.
- **Military Research & Development labs** – not a primary target since equipment will go to their cal labs for calibration

SMK Sales Tools

Prospecting Toolkit

- Datasheet
- Webinar
- Maximizer contacts

First Customer Meeting

- Product PowerPoint Slides
- Leave-behinds:
  - Datasheet
  - App Notes

Points of Differentiation

- Questions to Ask
- Competitive Selling Guide

Second Customer Meeting

- Product Demonstration or Webex