

Sync of Mobile radar platform

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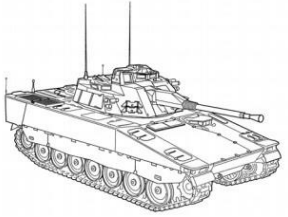
MEINBERG

The Synchronization Experts.

WORKSHOP
— ON —
SYNCHRONIZATION
— AND —
TIMING SYSTEMS

High Accuracy Network Timing

NO GNSS



"Automotive"

Vibration
Temperature
Shock
Water



Navigation
Drone
3D mapping
Weapon-system
Communication
Cryptography

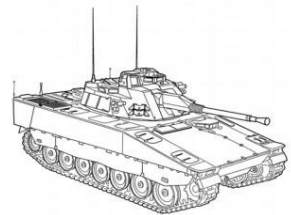
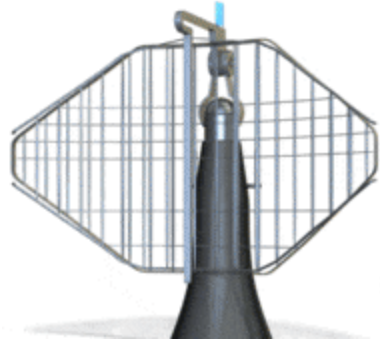


"RAN network"

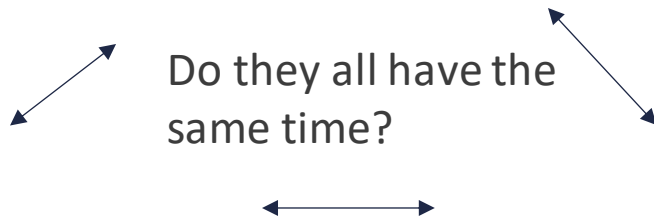
Sync
Radar
Sensors
Gyro
Laser
IR/Camera
LiDars
Microphone
Sonar

Radar Sync

NO GNSS



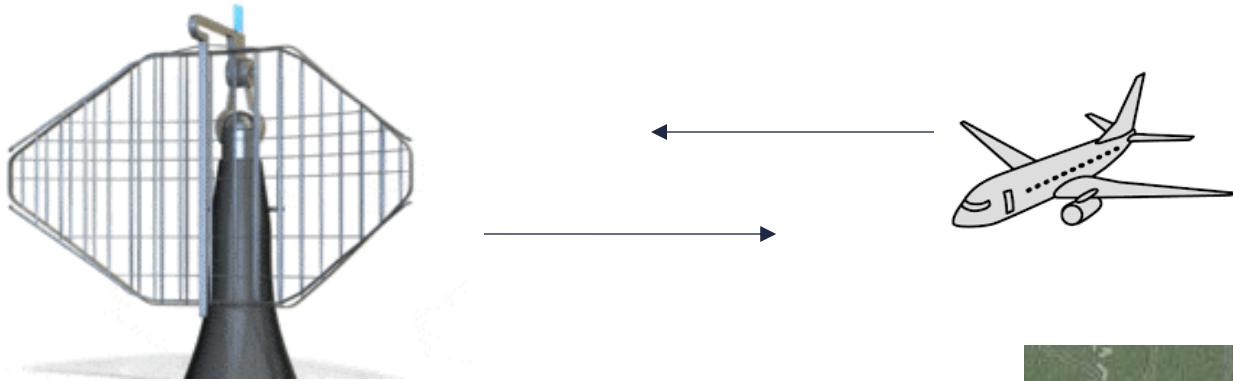
Do they all have the
same time?



Simple Radar Fix

Sender and receiver on the same location:

Active Radar

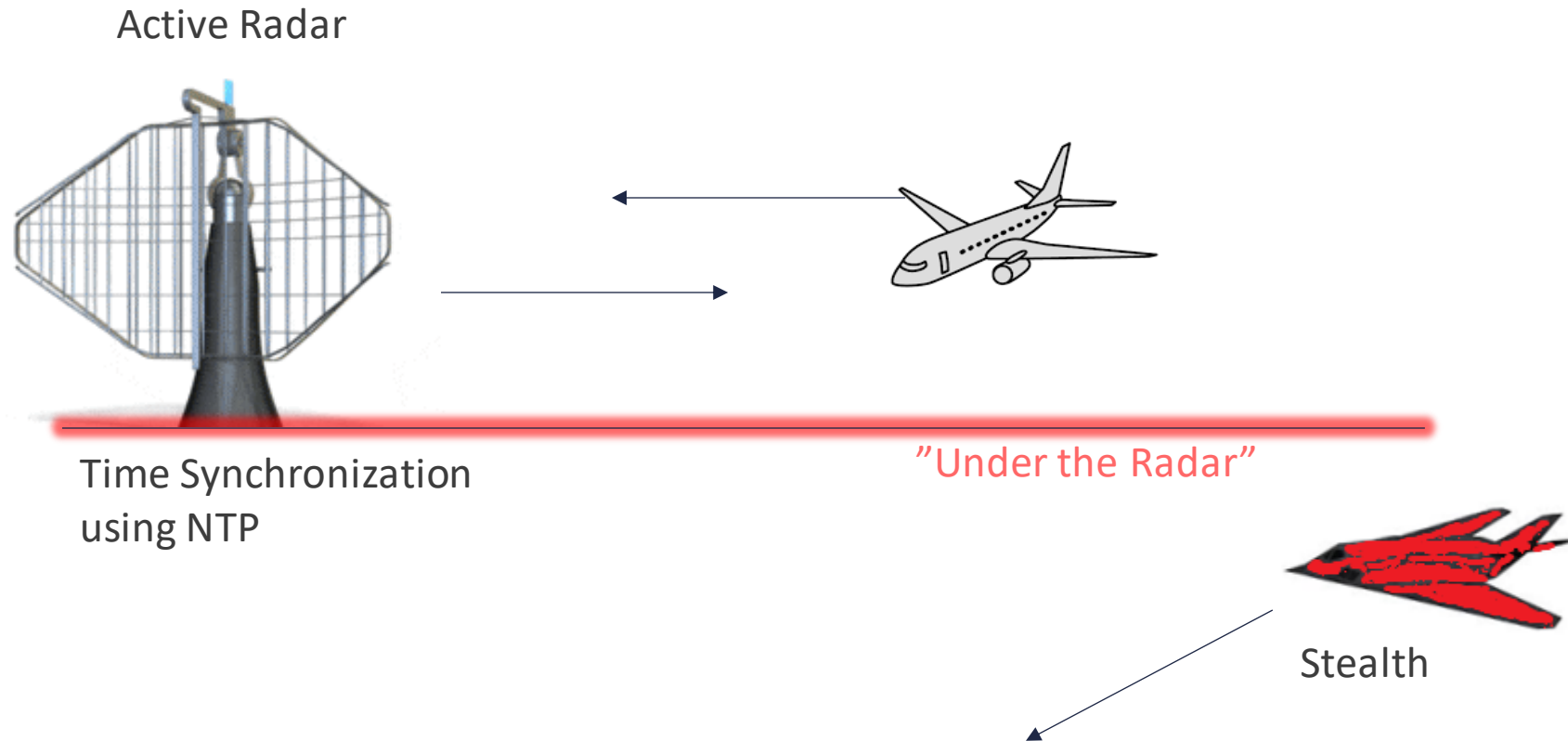


Time Synchronization using NTP



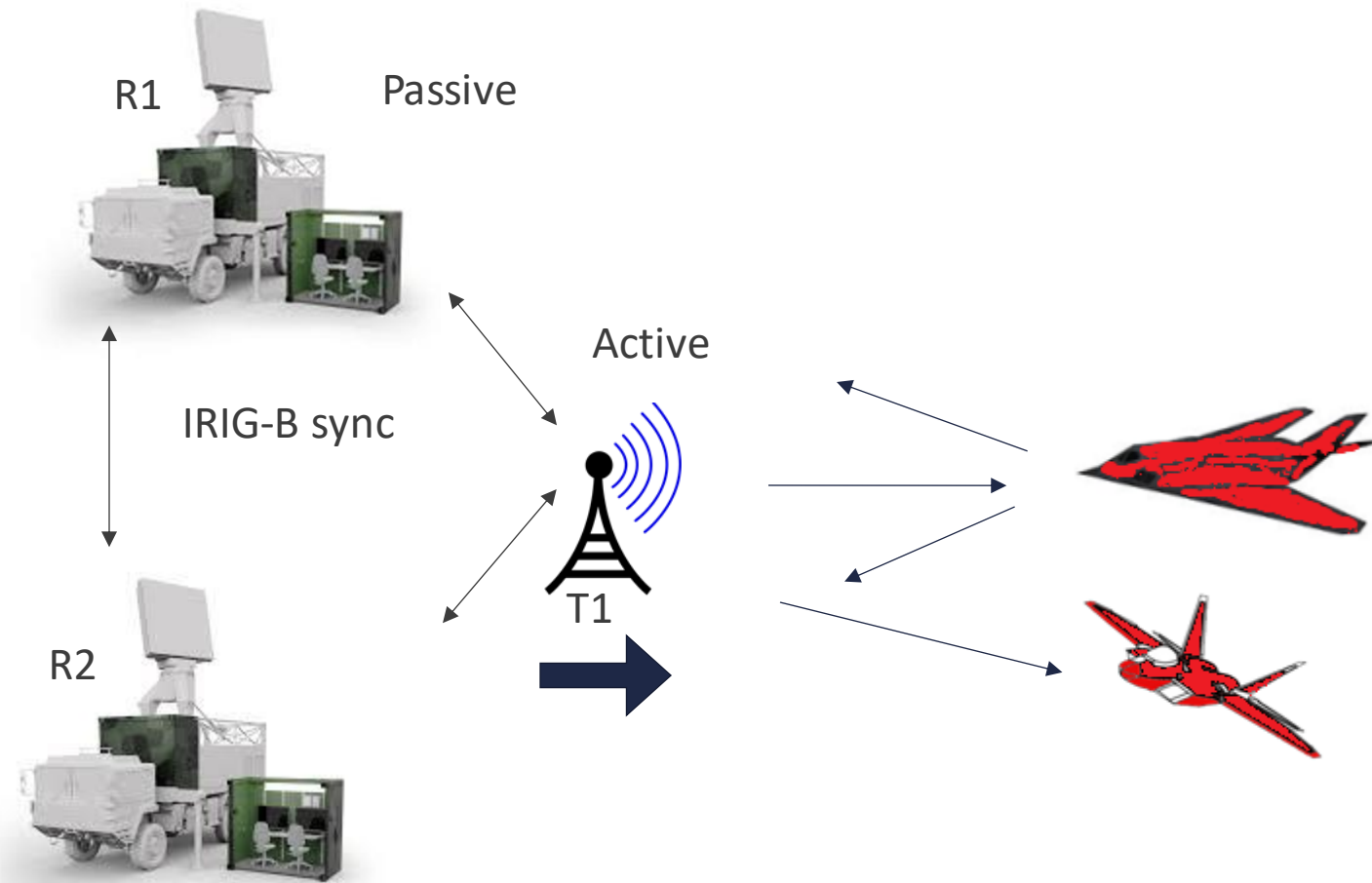
Simple Radar Fix

Sender and receiver on the same location:



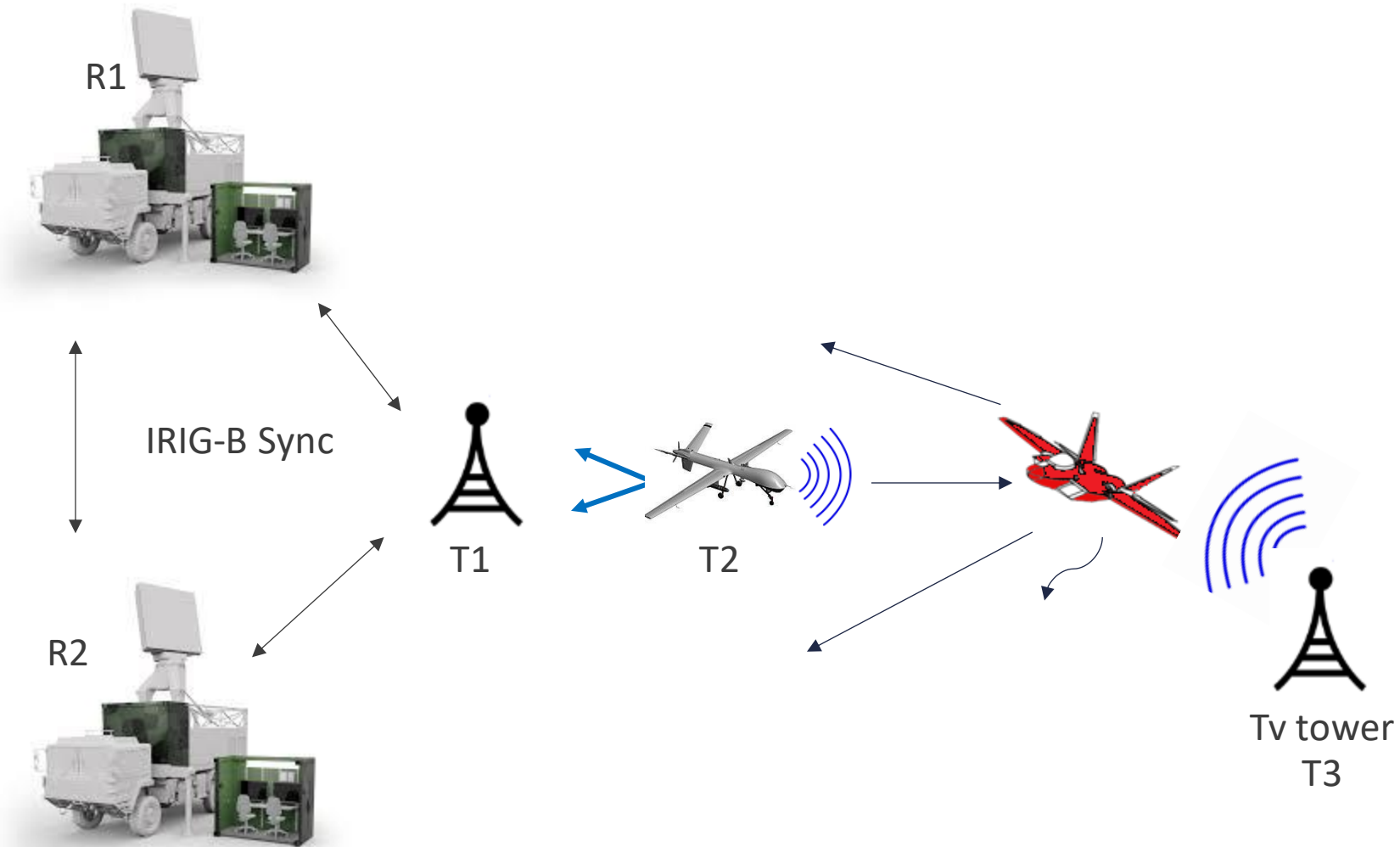
Distributed Radar Fix

Sender and receiver at different locations.



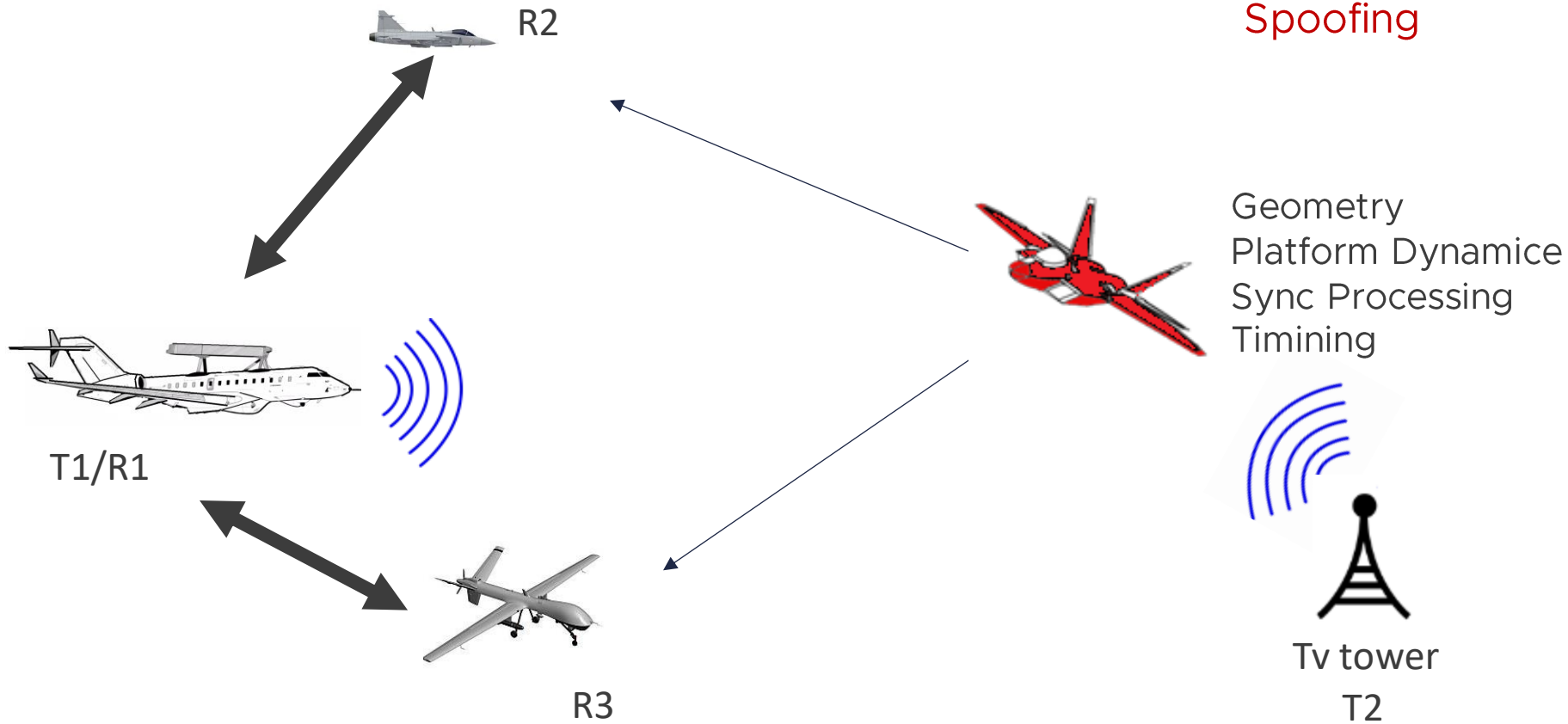
Distributed Radar, Bi-/Multi-Static Radar

T1 transmitter is backed up using T2 and/or T3



Mobile Radar

Transitioning radar to mobile platforms – how should communication be handled?



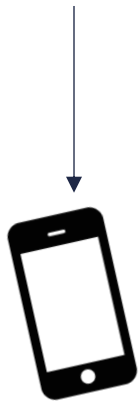
Comparison of Time Distribution Technology

Technology	1PPS	IRIG-B	NTP	PTP
Accuracy	20-100 ns	1-10 μ s	1-10 ms	20 ns-1 μ s
Automatic delay compensation?	No	No	Yes	Yes
Dedicated cables required?	Yes	Yes	No	No
Precise phase	Yes	Yes	No	Yes
Time of day	No	Yes	Yes	Yes

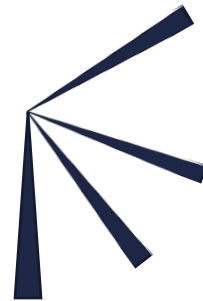


Array antenna

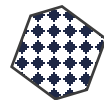
5G Telecom



Defense

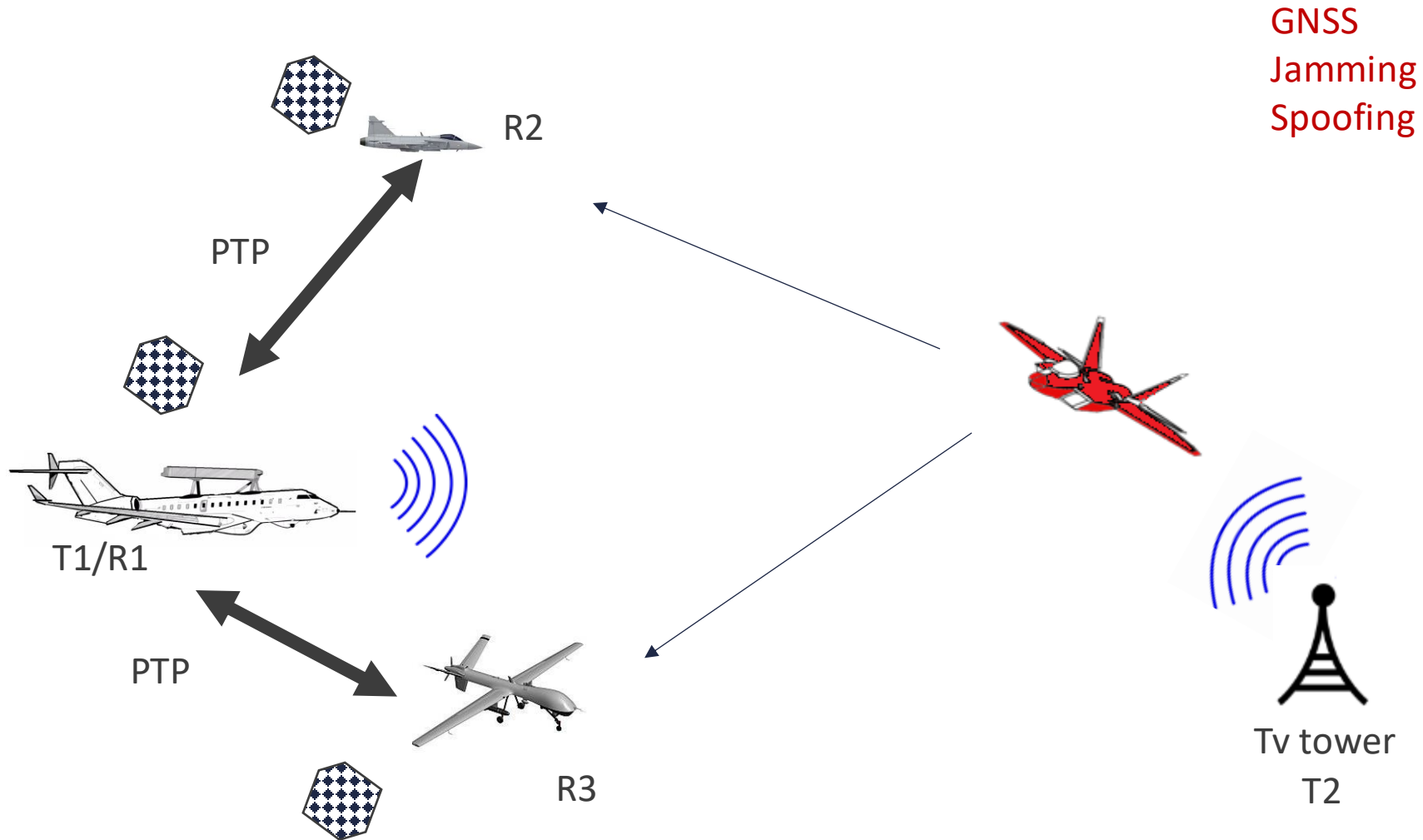


Small beam

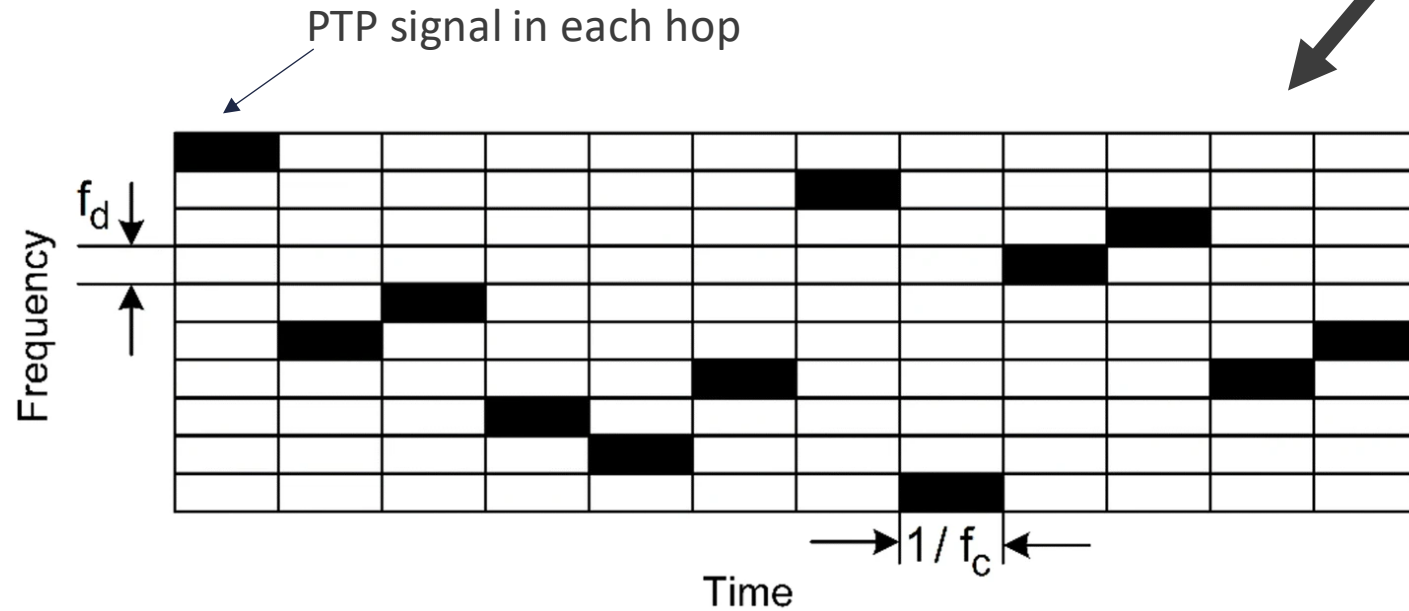


Mobile Radar

Tactical data link with PTP or other time information is needed



Communication Link Needs Sync Cryptography Adds More Problem



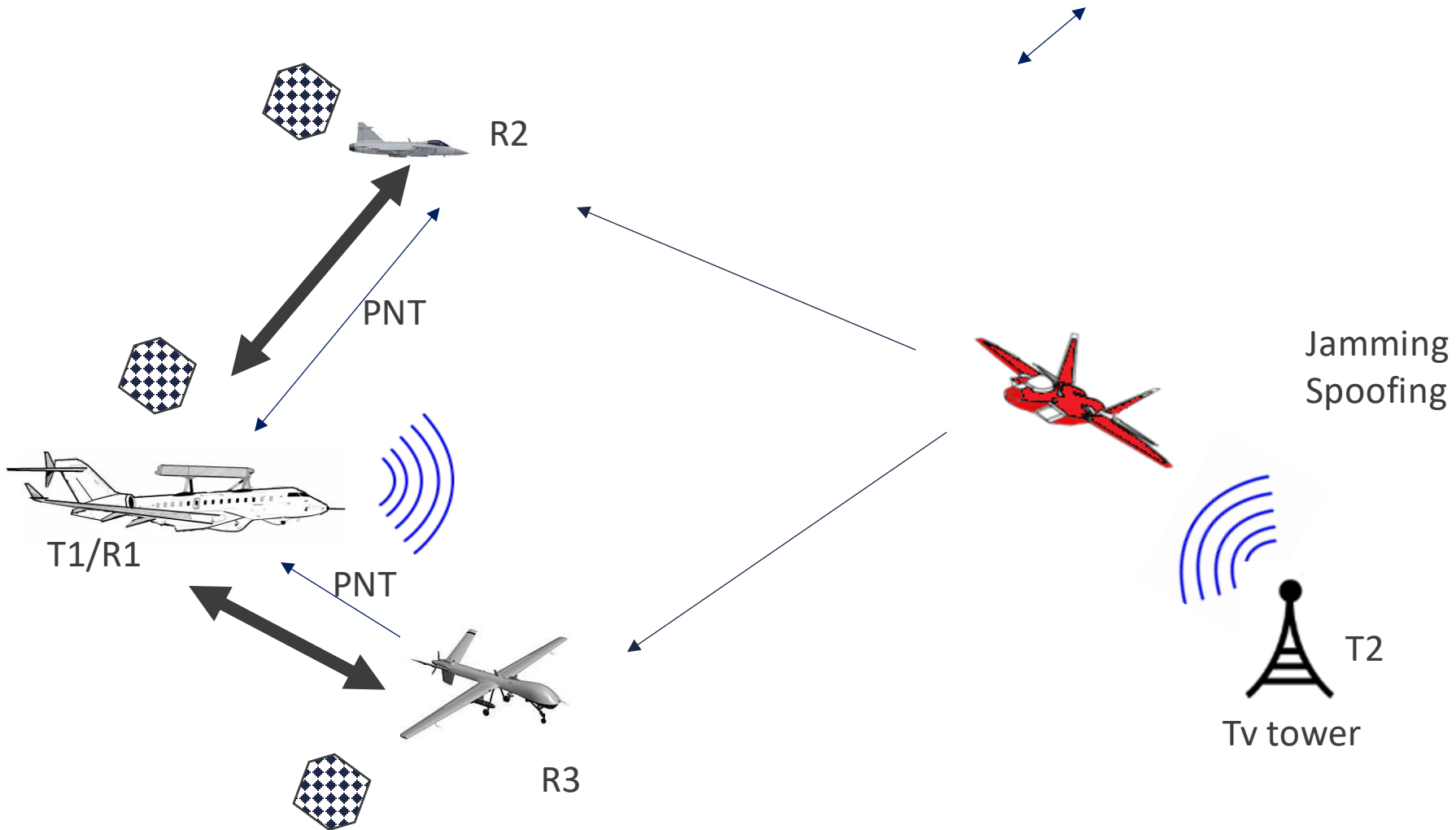
Example: With 512 frequency hops a second, you need 512 packets a second with PTP.



This is just like running PTP over a MPLS network.

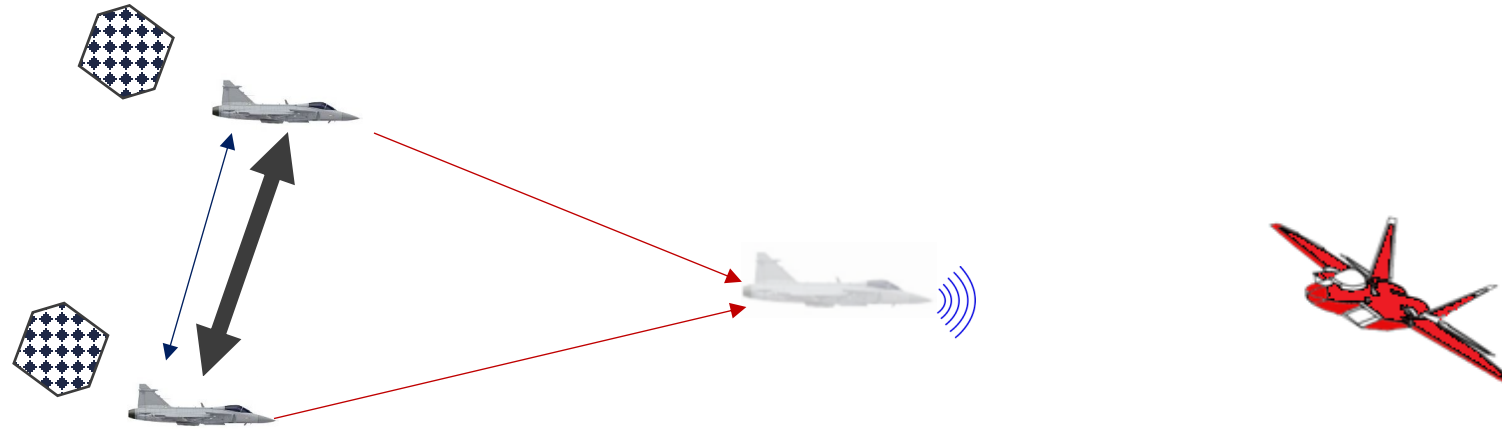
Mobile Radar

Radio link for PNT (Position, Navigation and Time).



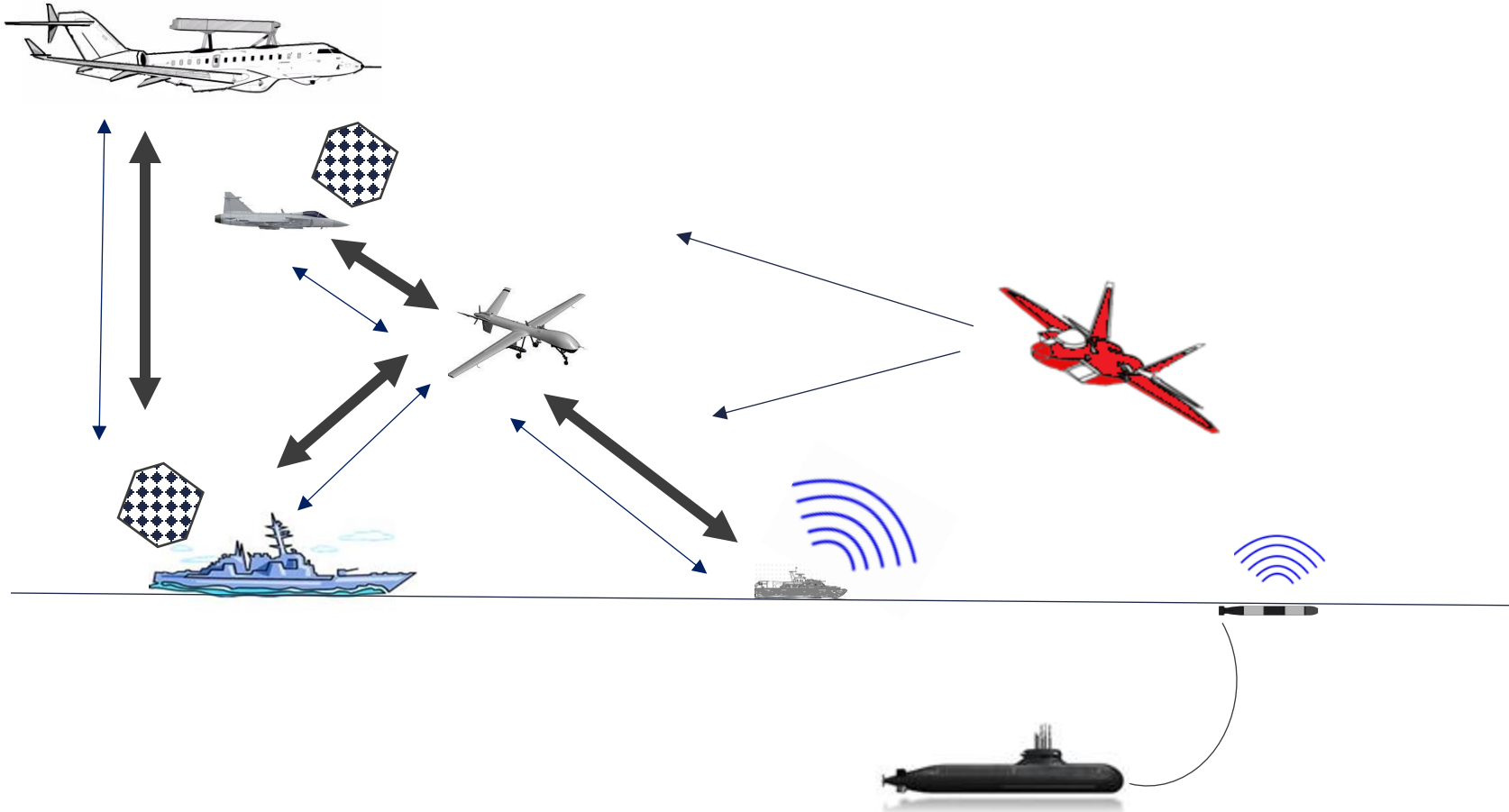
Radar as spoofer

Cross two radar beams to create a ghost airplane on the enemy radar.



Every Platform Has the Same Time

Synced time ensures that all platforms have comparable reconnaissance & surveillance data



Hide and Seek

The side that can hide while fooling the other side wins.

The side with the best sync is best positioned to fool the other side, while also seeing through the other side's deception.



The logo for Meinberg, featuring the word "MEINBERG" in a bold, italicized, blue sans-serif font. The letters are white with a blue outline, and the entire logo is contained within a white rounded rectangle with a blue border.

The Synchronization Experts.

Thank you!

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