

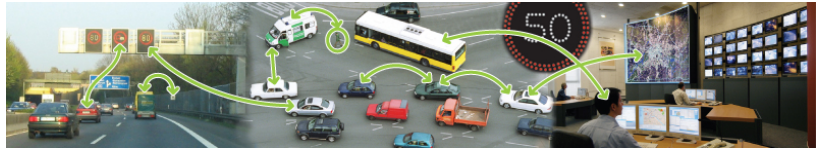
Versatile Automobile Antenna Unit for Roadside Communications

Irene Jensen, Jagath Kumara Halpe Gamage
SINTEF ICT, Trondheim, Norway

“Create a wireless network between vehicles & infrastructure”

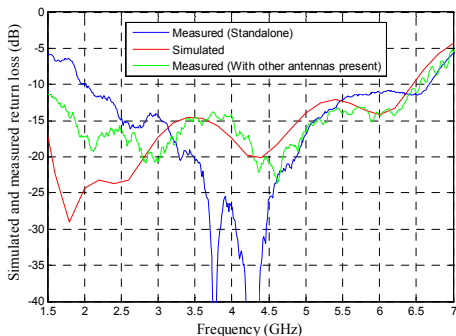
“Increase efficiency & safety through vehicle-infrastructure cooperation”

CVIS vision

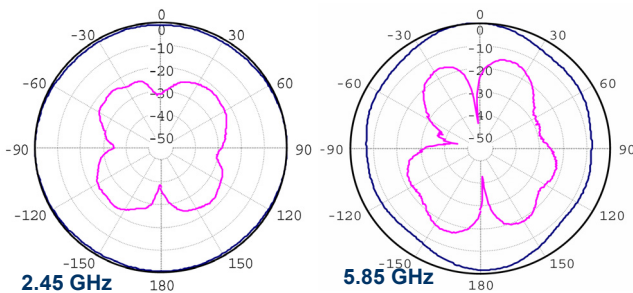


Electrical specifications and design goals for the individual antennas of the CVIS Rooftop Antenna Unit

Antenna	Required frequency band coverage	Recommended design goals
CALM M5 (2 ant)	2.4-2.484 GHz 5.15-5.35 GHz 5.47-5.725 GHz 5.725-5.95 GHz	S11 < -10 dB Frequency: 2.2 – 6.1 GHz (BW=107%) Polarization: Vertical Coverage: Azimuth Omni-directional
CALM 2G/3G	875-960 MHz 1710-1880 MHz 1850-1990 MHz 1900-2170 MHz	S11 < -10 dB Frequency: 0.85 – 2.25 GHz (BW=101%) Polarization: Vertical Coverage: Azimuth Omni-directional
GPS	1.575 GHz (RHCP)	COTS
CEN DSRC	5.8 GHz (LHCP) BW: 5 MHz	COTS (modified version)



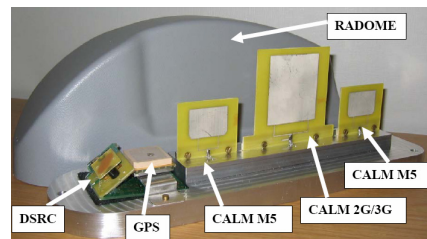
Simulated and measured return loss for double-fed printed monopole CALM M5 antenna



Measured co- and cross polarization radiation patterns for double-fed printed monopole CALM M5 antenna.

The CVIS Rooftop Antenna Unit

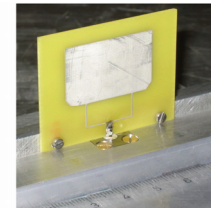
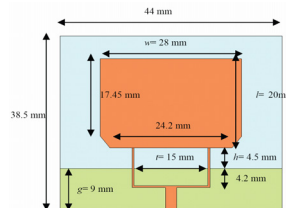
- Based on emerging “CALM” standards for vehicle and infrastructure communications
- Part of core technology development within CVIS project
- Rooftop Antenna Unit contains five individual antennas
 - Broadband GSM/UMTS antenna (CALM 2G/3G)
 - 2 Broadband WLAN antennas (CALM M5)
 - DSRC_system (short range microwave)
 - GPS antenna
- Both CALM 2G/3G and CALM M5 antennas are double-fed printed monopole designs
- Will be used for CVIS field trials at 6 different sites throughout Europe (France, Germany, Italy, Netherland/Belgium, Sweden, UK)



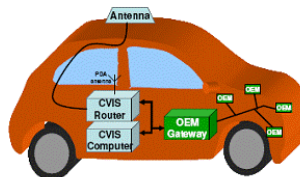
Picture of CVIS Rooftop Antenna Unit in front of radome cover. Base dimensions: 80 x 290 mm. Radome height: 115 mm.

The Double-Fed Printed Monopole

- Broadband characteristics obtained with
 - Rectangular shape of monopole
 - Chamfered corners
 - Two feed points
 - Ground plane pedestal
- Ansoft’s HFSS used for analyses and optimization of antenna design
- Final characteristics CALM M5 antenna:
 - Bandwidth: 2.0 – 6.7 GHz (128%)
 - Vertical polarization, XPD > 15 dB in omni-plane
- Manufactured on low cost PCB (FR4, 1.55 mm thickness)



Double-Fed Printed Monopole: Final parameters and picture of broadband CALM M5 antenna design.



SINTEF ICT
Contact: Irene.Jensen@sintef.no
www.sintef.no

CVIS facts:
Integrated Project - eSafety Priority
“Cooperative Systems for Road Transport”
Coordinator: ERTICO
Duration: 2006-2010
Total budget: € 41 Million
EC contribution: € 22 Million
61 partners - 12 countries
www.cvisproject.org

