

Amateur Radio Technician Exam Prep Course

Module 1

Welcome to Amateur Radio

- 1.1 What is Amateur Radio
- 1.2 The FCC and Licensing
- 1.3 Amateur Radio Activities
- 1.4 Getting Your Ham Radio License

Introduction

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Course Overview

1. Welcome to Amateur Radio
2. Radio and Signals Fundamentals
3. Electricity, Components, and Circuits
4. Propagation, Antennas, and Feed Lines
5. Amateur Radio Equipment
6. Communicating With Other Hams
7. Licensing Regulations
8. Operating Regulations
9. Safety
10. Examination time (what you may not know)!

What is Amateur Radio?

- Amateur (or Ham) Radio is a personal radio service authorized by the Federal Communications Commission (FCC)
 - To encourage the advancement of the art and science of radio
 - To promote the development of an emergency communication capability to assist communities when needed
 - To develop a pool of trained radio operators
 - To promote international goodwill by connecting private citizens in countries around the globe
- Through ham radio, you will become an ambassador for your community and your country

More About Amateur Radio ...

- The Amateur Radio Service is governed by Part 97 of the FCC Rules and Regulations *
- Anyone can be a ham radio operator, there is no age limit
- Amateur Radio operators cannot accept payment of any type for operating their radio, whether money or other goods or services **

* The exact reference is “Title 47 Code of Federal Regulations (CFR) Part 97” or **47 CFR Part 97**

** What if I want to get paid! You can ... get a **Commercial Radio Operator License** ...

<https://www.fcc.gov/commercial-radio-operator-license-program>

What Do Hams Do?

- Communicate
- Experiment
- Build
- Compete
- Serve their communities
- Engage in lifelong learning

What Makes Ham Radio Different?

- There are many unlicensed radio services available (FRS, GMRS, etc.)
- Amateur Radio is very flexible...
 - Fewer restrictions
 - More frequencies (channels or bands)
 - More power (to improve range and quality)
 - More ways to communicate
 - It's **FREE** to operate your radio!

With More Privileges Comes More Responsibility

- Ham Radios are much more capable and have the potential of interfering with other radio services
- Ham radios have unlimited reach, they easily reach around the globe and into space
- FCC authorization is required to ensure the operator is qualified to operate safely, legally and appropriately – this is why you are here

Steps To Obtaining Your License

- Study the material in the Ham Radio License manual (make sure you have the current edition)
- Review the question pool (back of the book)
- Take practice exams
 - www.arrl.org/examreview
- Practice a proctored 35 question multiple choice test
 - Questions pulled directly from the question pool
 - Need to answer 26 questions correctly (**miss 9**)

UHF

(1500 Watts PEP maximum)

23 cm

(1240-1300 MHz)

1240 MHz

1300 MHz

SSB, AM, FM, TV,
CW, Digital

33 cm

(902-928 MHz)

902 MHz

928 MHz

SSB, FM, TV,
CW, Digital

70 cm

(420-450 MHz)

420 MHz

430

450 MHz

Not available north of line A,
near the Canadian border

SSB, AM, FM, TV,
CW, Digital

See FCC Parts 97.3(a) and 97.303(m)

VHF

(1500 Watts PEP maximum)

1.25 m

(219-220 and
222-225 MHz)

219 MHz

220

222

225 MHz

Point to Point
Digital Links only

Amateur
operation
not allowed

SSB, AM, FM, TV,
CW, Digital

See FCC Part 97.303(l)

2 m

(144-148 MHz)

144 MHz

144.1

148 MHz

CW only

SSB, AM, FM, TV,
CW, Digital

6 m

(50-54 MHz)

50 MHz

50.1

54 MHz

CW only

SSB, AM, FM, TV,
CW, Digital

HF

(200 Watts PEP maximum)

10 m

(28.0-29.7 MHz)

28 MHz

28.300

28.500

29.7 MHz

CW, RTTY,
Data

SSB and CW

15 m

(21.0-21.45 MHz)

21 MHz 21.025

21.200

21.450 MHz

CW only

40 m

(7.0-7.3 MHz)

7.0 MHz 7.025

7.125

7.3 MHz

CW only

80 m

(3.5-4.0 MHz)

3.5 MHz 3.525

3.600

4.0 MHz

CW only

These frequencies are not available to Technician licensees

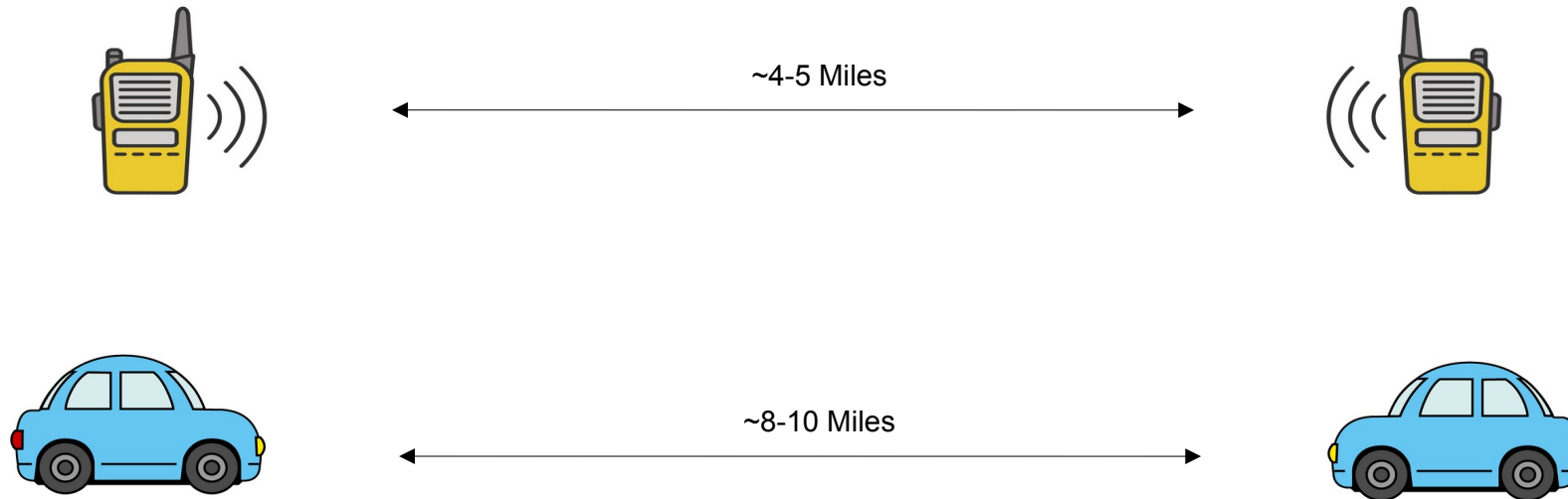
Introduction to Ham Radio

- Here is a handy chart giving approximate ranges for Ham radio transmission distance.

How far Can I Transmit with My Ham Radio? Here is a handy chart giving approximate ranges for Ham radio transmission distance.	Mode	Distance
Handheld to Handheld	FM Simplex	~5 Miles (maybe)
Handheld thru Repeater to Handheld	FM Simplex	~10 – 12 Miles (Handheld limits range)
Mobile to Mobile	FM Simplex	~ 25 Miles (maybe)
Mobile thru Repeater to Mobile	FM Simplex	55 Miles

Introduction to Ham Radio

- **How far Can I Transmit with My Ham Radio?**
 - **Simplex, Direct**

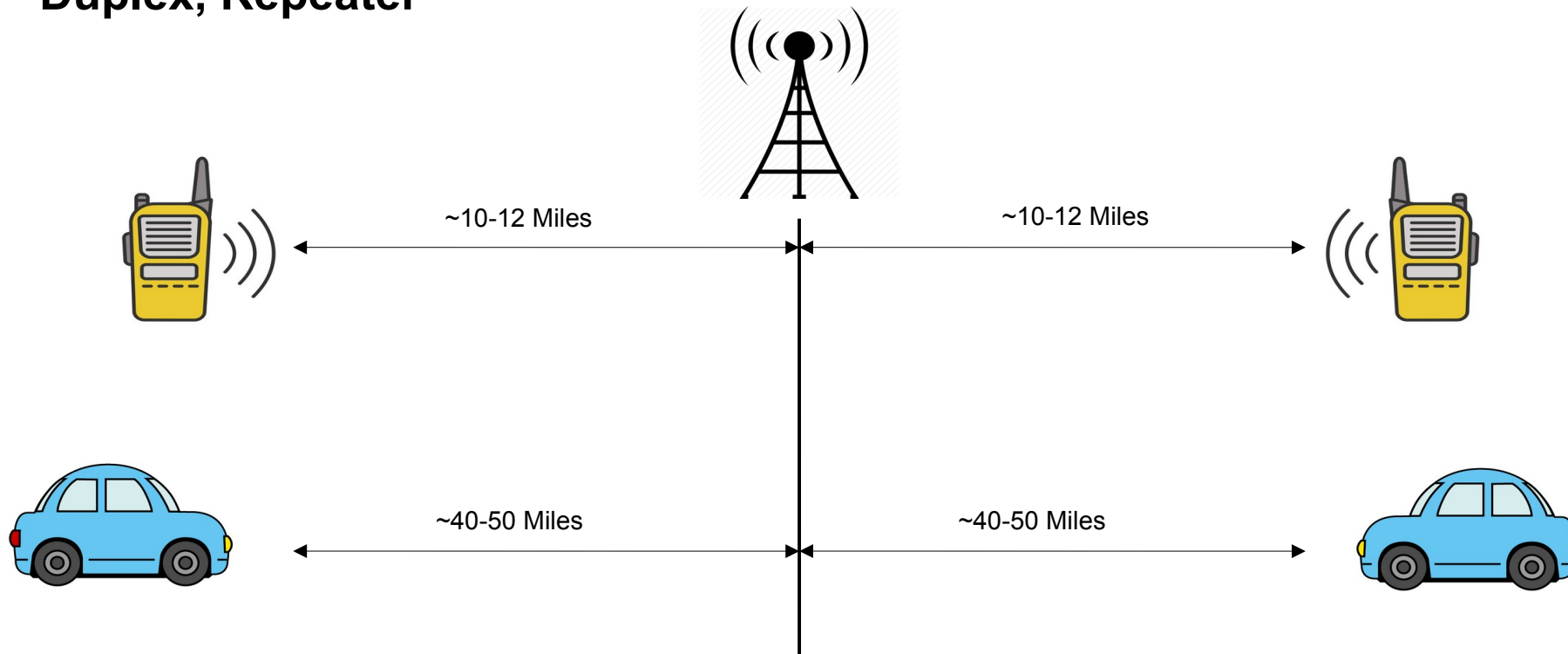


Your mileage may vary depending upon height above terrain. Terrain variations, vegetation, and atmospherics, also limit transmit distance

Your mileage may vary depending upon height above average terrain. Terrain variation and atmospherics, as explained in Part II, also limit transmit distance.

Introduction to Ham Radio

- **How far Can I Transmit with My Ham Radio?**
 - **Duplex, Repeater**



Introduction to Ham Radio

- Why are there distance limitations?
 - All Radio signals diminish between stations as distance increases
 - Positive Distance Factors controlled by operator
 - Transmitter power
 - Antenna Height
 - Coaxial feed-line loss
 - Antenna gain

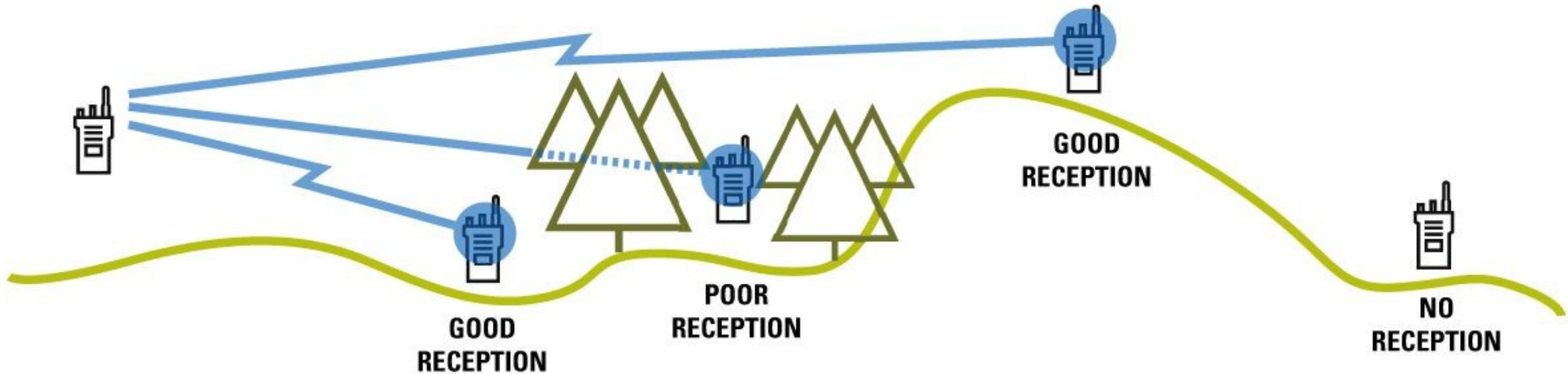
Introduction to Ham Radio

- Why are there distance limitations?
 - Negative factors ~ Operator has little control
 - Distance
 - Terrain Obstructions
 - Propagation Anomalies
 - Interference and Noise

Introduction to Ham Radio

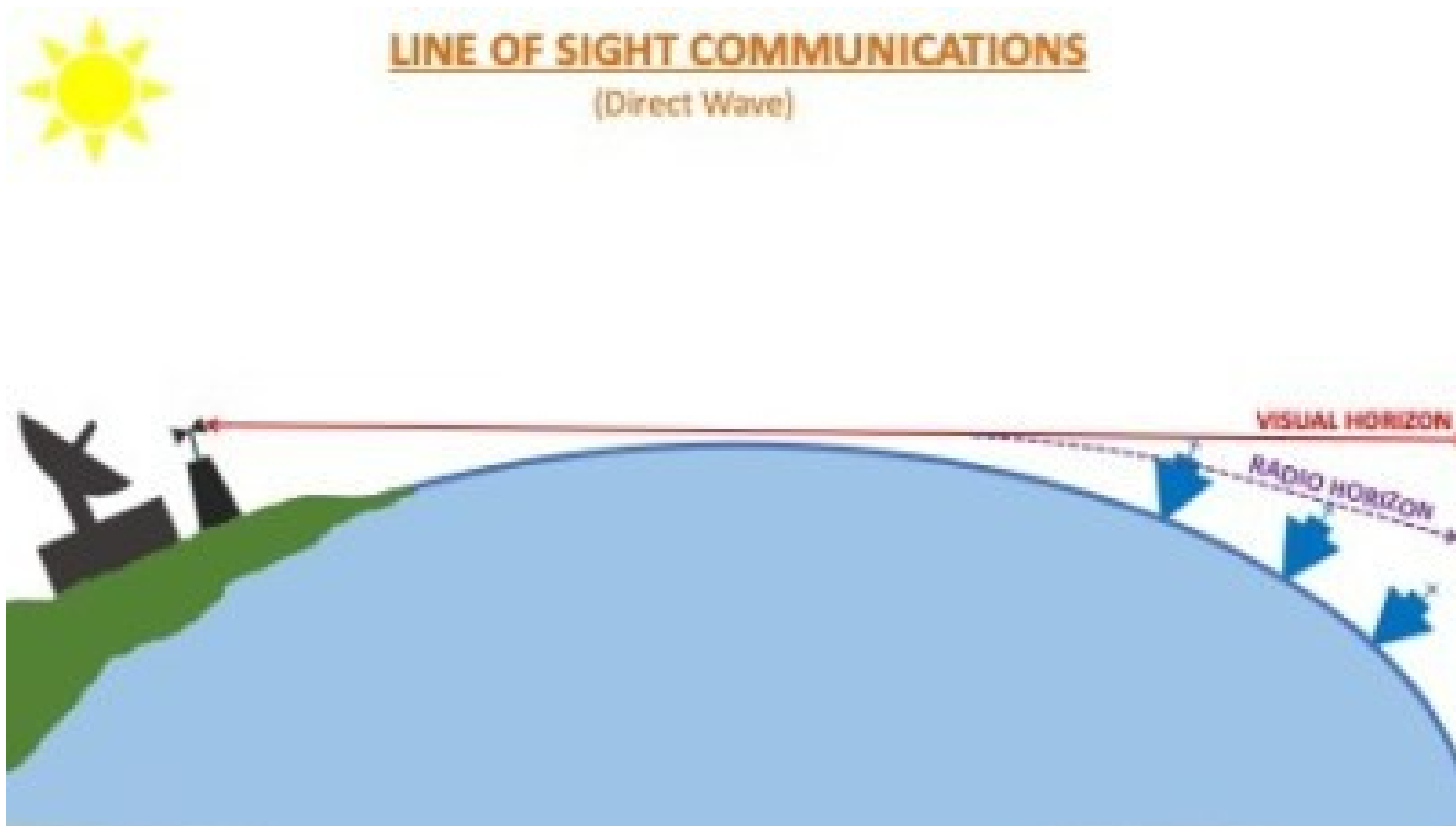
Distance Limitations

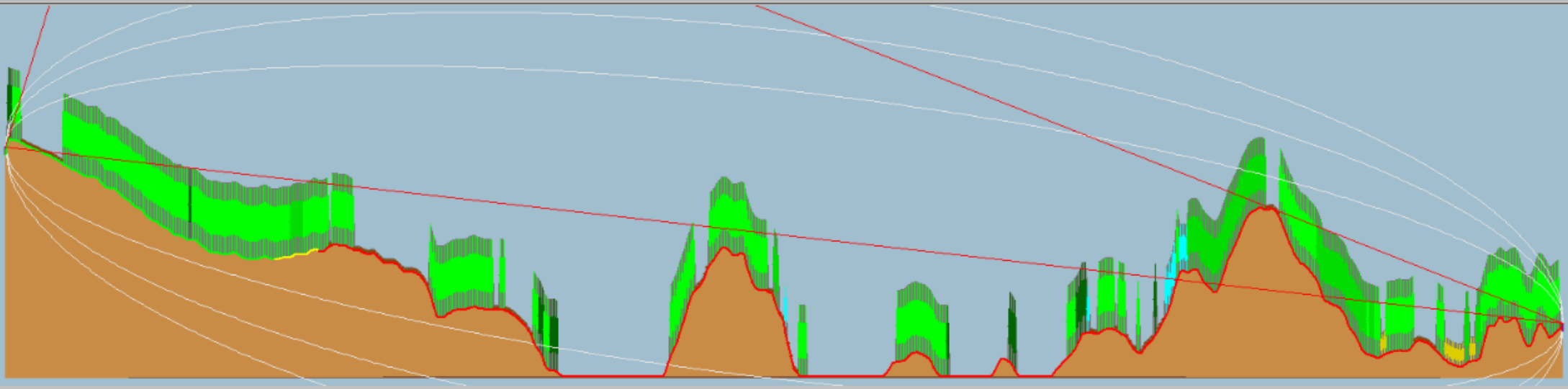
DIRECT MODE



Introduction to Ham Radio

Radio waves travel farther than visual (optical) line of sight





GMRS H2H*

[N1XP - HOME](#) (1)

Latitude	43.591067 °
Longitude	-70.689178 °
Ground elevation	141.0 m
Antenna height	1.7 m
Azimuth	330.41 TN 344.77 MG °
Tilt	-0.41 °

(2) [KC1JMH-Home](#)

Latitude	43.634561 °
Longitude	-70.723311 °
Ground elevation	104.0 m
Antenna height	1.7 m
Azimuth	150.38 TN 164.75 MG °
Tilt	0.36 °

Radio system

TX power	36.99 dBm
TX line loss	0.00 dB
TX antenna gain	-3.00 dBi
RX antenna gain	-3.00 dBi
RX line loss	0.00 dB
RX sensitivity	-113.02 dBm

Propagation

Free space loss	100.37 dB
Obstruction loss	49.78 dB
Forest loss	0.00 dB
Urban loss	1.00 dB
Statistical loss	30.05 dB
Total path loss	181.20 dB

Performance

Distance	5.563 km
Precision	10.0 m
Frequency	449.990 MHz
Equivalent Isotropically Radiated Power	2.506 W
System gain	144.01 dB
Required reliability	99.000 %
Received Signal	-150.21 dBm
Received Signal	0.01 µV
Fade Margin	-37.19 dB

END OF MODULE 1

