



High Gain HF Antennas for DX and Contests

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6 dB of “Free” Ground Gain



- 40 through 10 meters: a horizontally polarized dipole, Yagi or quad easily provides 6 dB of ground gain
 - but only if it is installed at the correct height
- 80 meters: If you cannot install a horizontal antenna at 25 meters high or higher:
 - use a vertical or a vertically polarized delta loop (corner fed), or
 - A four-square vertical is competitive with high horizontal arrays – use at least 30-60 radials on each vertical
- 160 meters: a vertical, inverted-L or vertically polarized delta loop is always a better choice than a horizontal antenna for DX

High Gain Horizontal Antennas



- Horizontal antennas for 80 through 10 meters
 - 6 dB of useful gain is easily obtained when you install your horizontally polarized antenna at the correct height
- What if you can't install your 80 meter horizontal antenna at 30 meters high or higher?
 - Use a four-square vertical array, a single vertical or vertically polarized delta loop
 - at least 32-64 shallow buried radials, 20 meters long, on each vertical

High Gain Antennas for 160 Meters



- A single full size vertical or vertically polarized delta loop
 - at least 40 meters from all tall towers (over 25 meters tall)
 - use much more than 40 meters of spacing for best performance
- A short inverted-L vertical is also an very good antenna
 - as little as 15 meters vertical (but more is better...)
 - supported from a tower or trees
- Use at least 32-64 shallow buried radials, 40 meters long
 - Or use at least two (preferably four or more) elevated radials, 40 meters long, but only if buried radials are impossible

The 4-Square Vertical Array for 80 Meters



- A four square vertical array is very competitive with high horizontal arrays and its an excellent receiving antenna
 - install at least 40 meters from all other towers
 - more spacing from other towers will significantly improve performance
 - at least 32-64 slightly buried radials on each vertical
 - at least 40 meters long

Four-Square Verticals for 40-10 Meters An Alternative to Rotators and Towers



- A 40 meter four-square vertical array is a good alternative when a horizontal antenna isn't possible
 - if a horizontal antenna can't be installed at least 20 mtrs high
 - a very good transmitting antenna for a second radio
 - an excellent receiving antenna
- A 20, 15 or 10 meter four-square vertical is a useful alternative when a horizontal antenna isn't possible
 - if a horizontal antenna can't be installed at least 10 mtrs high
 - a very good transmitting antenna for a second radio
 - an excellent receiving antenna

High Performance Antennas for 160 Meters



- Full size vertical, inverted-L or vertically polarized delta loop
 - almost always better than a horizontal antenna for DX (>99%)
- Major factors affecting vertical antenna performance:
 - nearby towers over 25 meters high will severely degrade 160 meter vertical antenna performance
 - Use at least 32-64 shallow buried radials, 40 meters long
 - makes the difference between an excellent vertical antenna and a disappointing antenna
- High performance receiving antennas
 - Beverages, loops, and arrays of short verticals

High Performance Antennas for 80 Meters



- A horizontal dipole, at least 25 meters high
- Or a full size vertical, inverted-L or vertically polarized delta loop
 - Use at least 32-64 shallow buried radials, 20 meters long
- Major factors affecting vertical antenna performance:
 - nearby towers over 12 meters high will degrade performance
 - at least 32-64 shallow buried radials, 20 meters long, makes the difference between an excellent antenna and a poor antenna
- High performance receiving antennas
 - Beverages, loops, and arrays of short verticals

Comtek 4-Square Controller

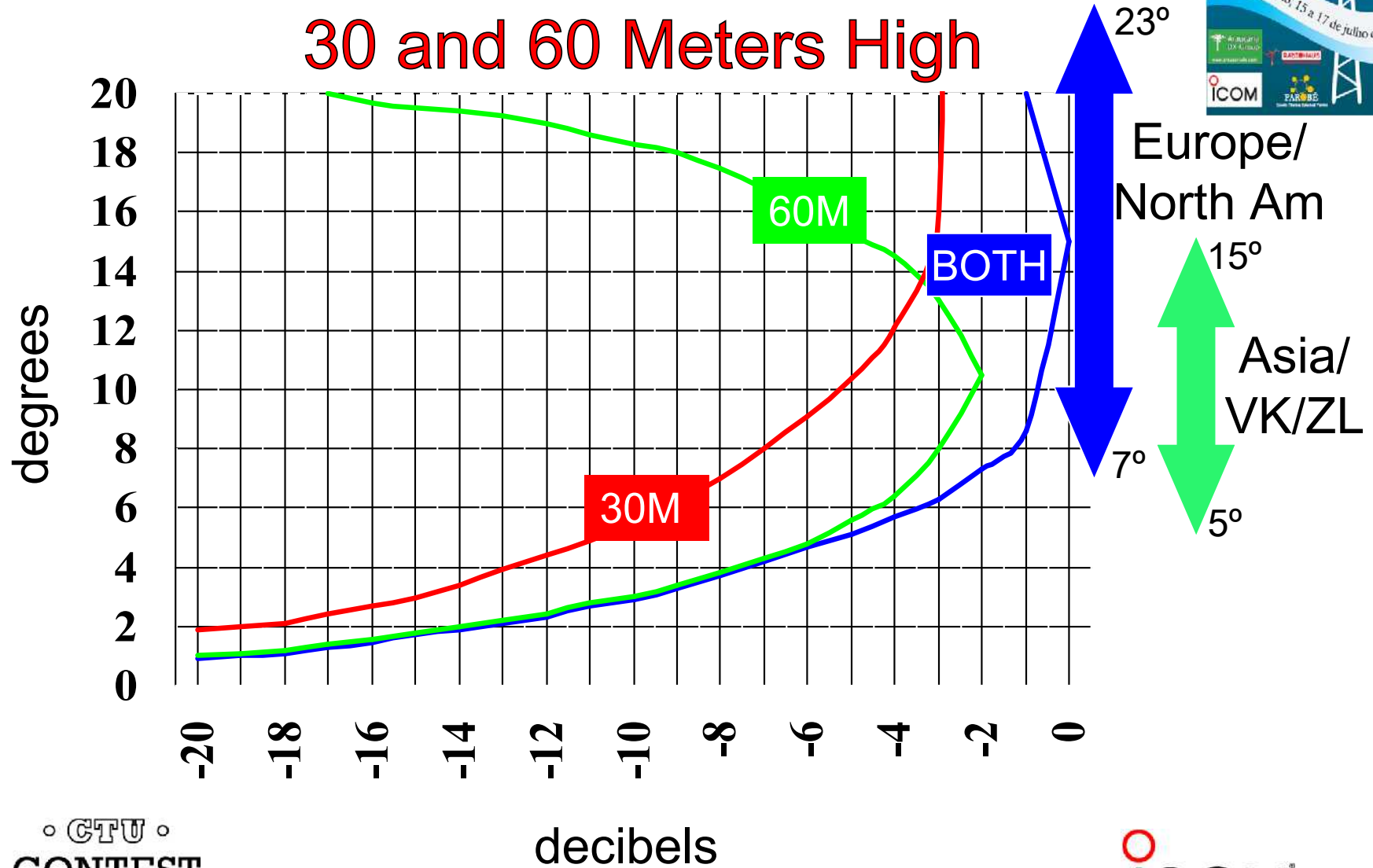


High Performance Antennas for 40 Meters



- A horizontal dipole 25 to 30 meters high
 - otherwise use a four-square vertical array with extensive radials
- Higher gain: a 2 element Yagi at 25 to 30 meters high
 - significant improvement over a horizontal dipole
 - a Cushcraft XM-240 at 25 to 30 meters is very cost effective
- Highest gain: a full size 3 element Yagi or MonstIR on a 30 to 40 meter tower
 - but don't underestimate the high cost and complexity of the effort !
- High performance receiving antennas
 - Beverages, loops, and arrays of short verticals

Stacked 3 Element 40 Meter Yagis 15 Meter Booms 30 and 60 Meters High

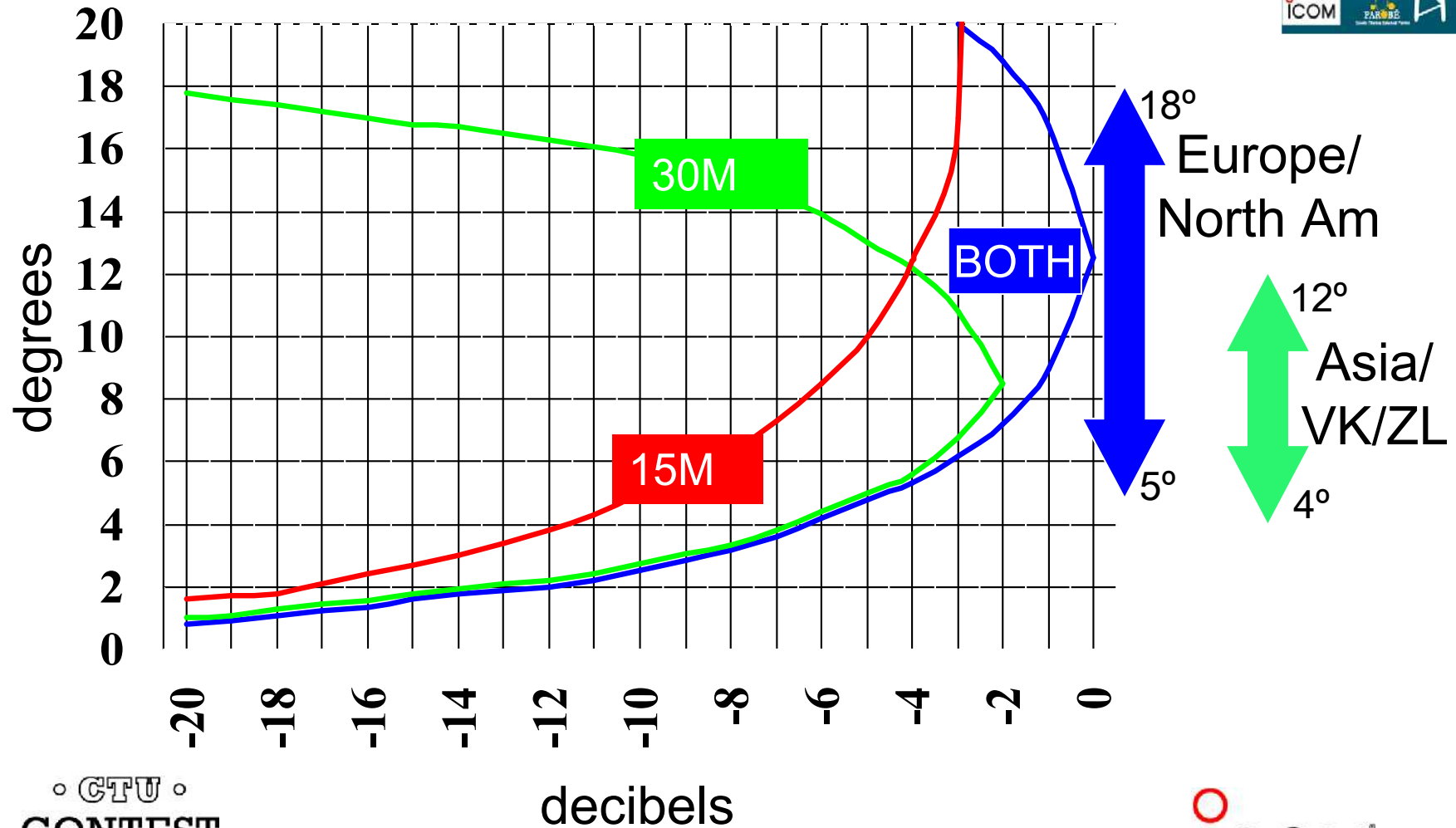


High Performance Antennas for 20 Meters



- A horizontal Yagi or quad is always the best choice
 - if you can install your antenna at 10 meters high or higher
 - otherwise use a four-square vertical array with extensive radials
- Moderate gain: small tribander, Yagi or quad
 - a small triband Yagi at 15 to 20 meters will produce good results
- High gain: full size triband Yagi or a small monoband Yagi or quad at 20 to 30 meters high
- Highest gain: two stacked monoband Yagis on a 30 to 40 meter tower (or 45 to 60 meters high with 3 Yagis)
 - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 5 Element 20 Meter Yagis 15 Meter Booms 15 to 30 Meters High



The Array Solutions Stack Match

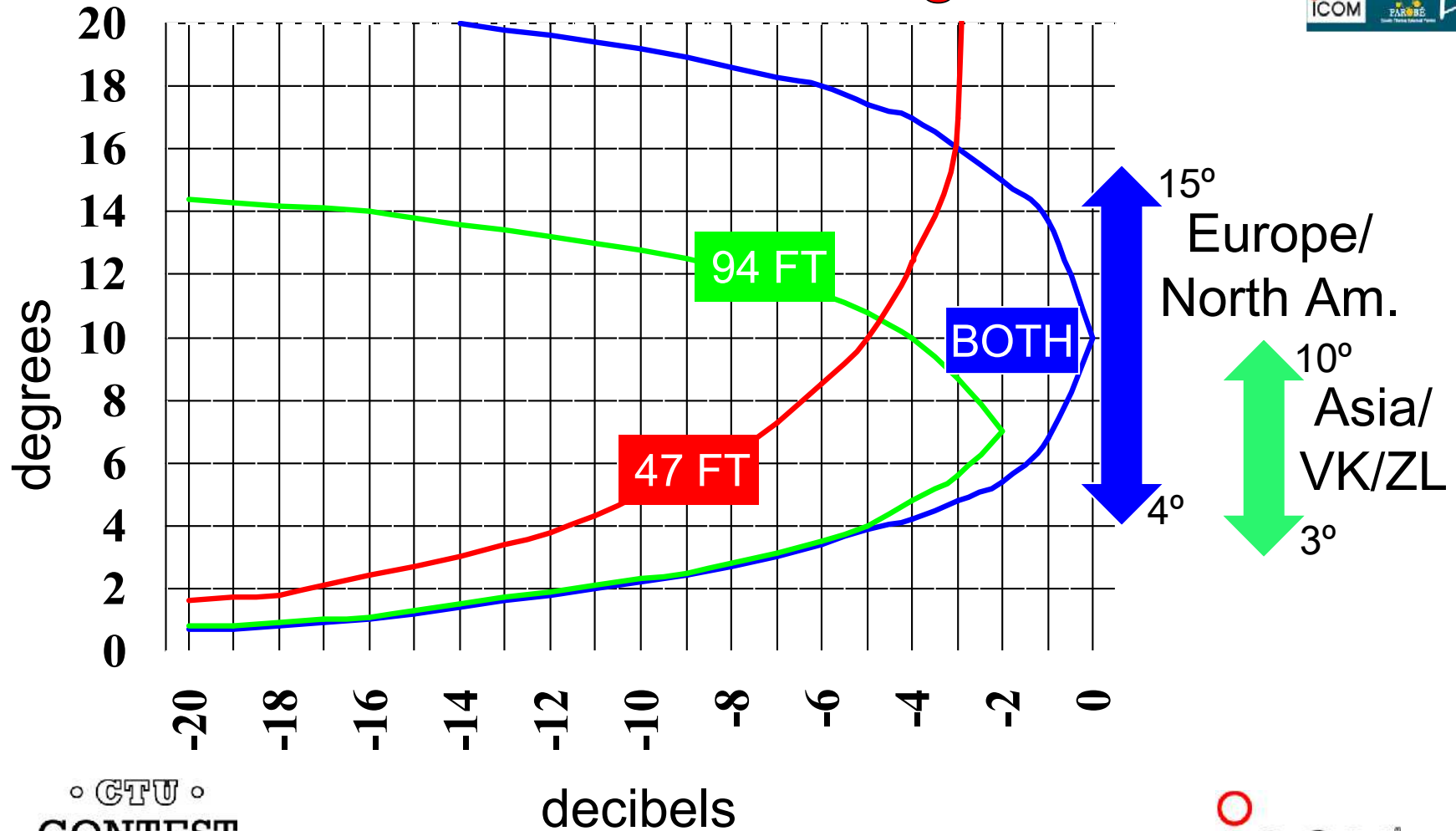


High Performance Antennas for 15 Meters



- Horizontal polarization is always the best choice
 - if you can install your antenna at 8 meters high or higher
 - otherwise use a four-square vertical array with extensive radials
- Moderate gain: a tribander, small Yagi or quad
 - a small triband Yagi, 10 to 15 meters high will produce good results
- High gain: a full size tribander or small monoband Yagi or quad at 20 to 30 meters high
- Highest gain: two stacked monoband Yagis on a 25 to 30 meter tower (or 35 to 40 meters with three Yagis)
 - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 6 Element 15 Meter Yagis 15 Meter Booms 15 and 30 Meters High

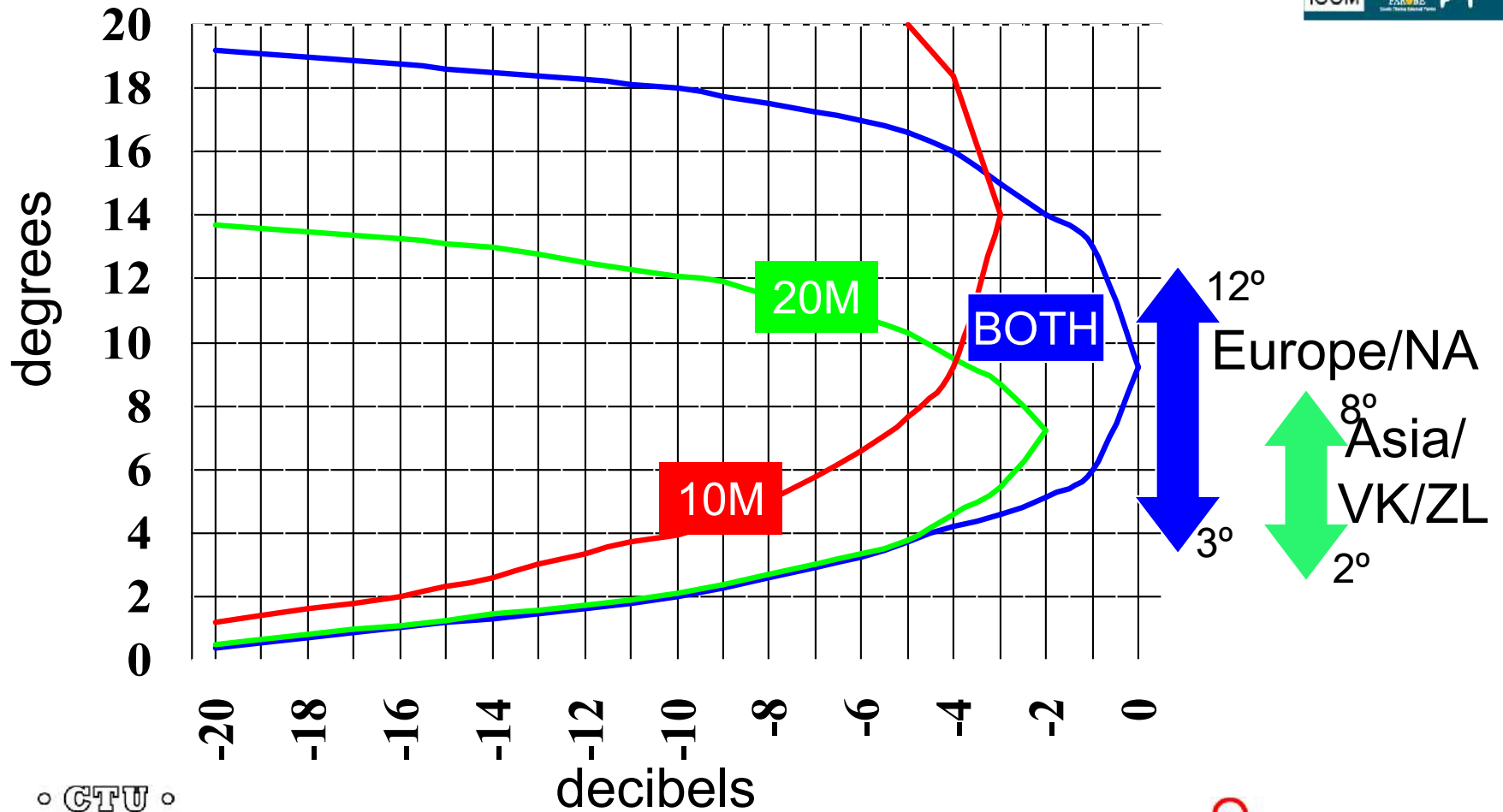


High Performance Antennas for 10 Meters



- Horizontal polarization is always the best choice
 - if you can install your antenna at only 6 meters high or higher
 - otherwise use a four-square vertical array with extensive radials
- Moderate gain: a tribander, small Yagi or quad
 - a small triband Yagi 8 to 15 meters high will produce good results
- High gain: a full size tribander, small monoband Yagi or quad, 15 to 20 meters high
- Highest gain: two stacked monoband Yagis on a 15 to 20 meter tower (or 25 to 40 meters with three Yagis)
 - stack switching (a “stackmatch”) provides high payoff at low cost

Stacked 6 Element 10 Meter Yagis 11 Meter Booms 10 and 20 Meters High



High Performance with Low Loss Coaxial Cables



- Reduce the loss in your coaxial cables
- Use hard-line (e.g., Heliax) transmission lines for all cable runs more than 30 meters long
 - RG-213 and other flexible jacket coaxial cables are very susceptible to physical damage and water entry
 - even a pin hole can quickly cause a high loss cable
 - protection from physical damage and water entry is critical
- Assure continued low loss by testing and inspecting your coaxial cables and connectors at least once per year