SISTEMI DI ANTENNE
RICEVENTI
PERCHÉ ABBIAMO BISOGNO?

- BECAUSE OF THE NOISE ON 160÷40!
- YOU CAN TRANSMIT WITH GREAT SUCCESS ON VERTICAL, EVEN ON DIPOLE ...

BUT IF YOU CAN NOT RECEIVE EVERYONE WHO IS CALLING YOU ...

YOUR ARE AN

ALLIGATOR!

COCCODRILLO!
PERCHÉ ABBIAMO BISOGNO?

• YOUR TX ANTENNA HAS TO DELIVER STRONGEST SIGNAL
• EFFICIENCY IS NEEDED

• BUT RX ANTENNA HAS TO IMPROVE SIGNAL TO NOISE RATIO ONLY

• TO SOME DEGREE GAIN/EFFICIENCY IS NOT A BIG DEAL
ANTENNE RICEVENTI:

- Key to success in DXing, Contesting
- Much less expensive compare to transmit antennas
- Yes, requires some real estate, knowledge, efforts and budget
ANTENNE RICEVENTI

• COSA STANNO COMBATTENDO?
REDUCING:

• **QRN:**
  - IMPROVING SIGNAL TO NOISE RATIO BY USING DIRECTIONAL PATTERN

• **QRM:**
  - NULLING UNWANTED DIRECTIONS – STATIONS WHO IS STRONGER THEN DX
NOISE SOURCES:

- LOCAL
- PROPAGATED
- EVEN COSMIC

IS WHAT AFFECTS YOUR ABILITY TO HEAR WELL
Nowadays SDR radios makes measurements much easier and informative.

Learn your QTH noise pattern, how does it change during nights and seasons.
NOISE: LOCAL SOURCES

HOME APPLIANCES LIKE:
- POWER SUPPLIES
- LED LIGHTS
- POMPE
- COOLING AND HEATING SYSTEMS
- POWER POLES WITH LEAKING INSULATORS
- ANYTHING WHAT CAN APPEAR IN A CASA VICINA

CAN BE AS FAR AS FEW KILOMETERS AWAY!
DIVERSE PROPRIETÀ DELL'ANTENNA

- RADIATION PATTERN IN A VERTICAL AND HORIZONTAL PLANE

- GAIN, (NEGATIVE)

- RDF - MEASURE OF PROPERTIES (PARTIALLY USEFUL), SOMETHING IN THE RANGE OF 4÷15DB

- SENSITIVITY TO OTHER ANTENNAS, METAL STRUCTURES

- POLARIZATION
NOISE: LOCAL SOURCES WHAT TO DO?
NOISE:

LOCAL SOURCES

FORZA!
NOISE: FIND A SOURCE FIRST

LOCAL SOURCES

REPLACE OR REPAIR
NOISE:

- Natural atmospheric, propagated with darkness, distant thunderstorms etc.

- Not equally distributed from directions!

- Coming at the different arrival angles at sunset, midnight and sunrise!

SKY WAVE
PROPAGATED SIGNALS

- Noise at equator is a very special case
- Noise is almost absent over the polar circle
NOISE:

SKYWAVE
PROPAGATED
SIGNALS

WHAT TO DO?
NOISE: BUILD
SKYWAVE ANTENNAS
PROPAGATED WITH DIRECTIVITY!
SIGNALS
HOW TO CHOOSE RECEIVE ANTENNA?
ANTENNE RICEVENTI:

• YOU WILL NEVER HAVE ENOUGH NUMBER OF RECEIVE ANTENNAS!

• BEST ANTENNA DOESN’T EXIST!
YOU NEED ANTENNAS:

- To different directions
- With different vertical pattern
- With different horizontal pattern: not only sharp, but wide also
ANTENNE RICEVENTI:

- It is necessary to count on arrival angle of incoming signal
- And arrival angle is different at different time of the night
**ANTENNE RICEVENTI:**

**PROPIAGATION FACTORS**

**BEFORE AND RIGHT AFTER THE SUNSET,** most often arrival angles is very low from east at our latitudes.

Only those of us who had tried to switch beverage length between 300 / 600 / 1000 meters on the same station, at the same time knows how amazingly it works!

Main reason for better reception is change of vertical angle, not the beam wide change.

We need lower angle antenna to the east at sunset!
ANTENNE RICEVENTI:

QUITE A DIFFERENT STORY ON SUNRISE:

AT THE DAWN, MOST OFTEN WE NEED HIGHER ARRIVAL ANGLE ANTENNA TO THE WEST

VERY OFTEN LOW DIPOLE, INVERTED VEE (ANTENNAS WITH A HIGHER VERTICAL PLANE), WILL OUTPERFORM PRETTY GOOD BEVERAGE AT THE DAWN AND AFTER

YOU MUST TRY DIFFERENT ANTENNAS, NOT ONLY THE ONE YOU LIKED AT MIDNIGHT!
È ANCHE IMPORTANTÉ DA RICORDARE

ESPERIENZA DI APPRENDIMENTO DIFFICILE

- POLAR PATH IS SKewed
- DIFFICULT, LONG DISTANCE PATH, (PACIFIC) MAY BE HEARD FROM AS MUCH AS 30°-45° DEGREE SKewed DIRECTION

- MAGNET DECLINATION CAN BE SURPRISINGLY BIG IF YOU ARE IN A DXPEDITION OUTSIDE OF EU. CHECK IT BEFORE PUTTING ANTENNAS IN THE FIELD!
  - USE A RIGHT TOOL TO AIM YOUR ANTENNA!
US/UK World Magnetic Model - Epoch 2015.0
Main Field Declination (D)
IF YOU HAVE RECEIVE ANTENNAS, YOU SHOULD TAKE CARE OFF:

**DECOUPLING** YOUR RX ANTENNA FROM:

- Transmit Antennas
- Towers
- Feedlines
- Power Lines
DECOPLING:

GENERAL RULE OF THUMB IS THAT AT LEAST 1-2 WAVELENGTH OF CLEAR SPACE IS NEEDED AROUND RECEIVE ANTENNA

OTHERWISE IT`S MODELED PATTERN WILL BE AFFECTED WITH INFLUENCE OF RERADIATION FROM ANTENNAS, TOWERS, GUY WIRES, FEEDLINES POWER LINES ETC.

CACTUS, CESPUGLI E ALBERI ARE OK
CHE TIPO DI ANTENNA È NECESSARIA?

FOR DX ING?

• COMFORTABLE BLA-BLA-BLA WITH EU? LOOP?

• WORK SOME NEW ONES AND DX (NOW YOU HAVE #73 DXCC COUNTRIES CFM)? 2X2 DIRECTION LOOPS?

• TO PUT INTO THE LOG THE VERY LAST DXCC ENTITY ON 160? LONG BEVERAGE?

• TO WORK SOME QUITE RARE DX PEDITION FROM PACIFIC OR ASIA? 2-3 LONG BEVERAGES?
• Che tipo di antenna è necessaria?

For Contesting?

• To win EU in a WW160SSB contest?
• To work 3rd layer of US 100W station in WW160CW?
• To run inband on 160?

12 Long beverages?

4 X Long beverages stack?

Many phased arrays and good engineering?
COSA TI SERVE A TE?

QUESTI SONO SISTEMI DIVERSI!
VARIETÀ DI RECEVENTI
ANTENNE

• OCUPYING A SMALL SPACE
• OCUPYING A BIG SPACE
• ALTE ANTENNE
• ANTENNE QUASI INVISIBILI MA EFFICACE
SISTEMA SINGOLA DI DIREZIONE:

- COSTITUITI DA ELEMENTI (1÷6) A BEVERAGE
- COSTITUITI DA ELEMENTI (1÷8) A LOOP
- COSTITUITI DA ELEMENTI A (1÷8) VERTICALI
**VARIETÀ DI RICEVENTI ANTENNE**

**SISTEMI MULTI DIREZIONALE:**

- COSTITUITI DA ELEMENTI **VERTICALI**
  (3÷8):
  - **MULTIBANDA** - HIGH IMPEDANCE SYSTEMS (WIDEBAND PREAMPS CAN BE A PROBLEM)
  - **MONOBANDA** - LOW IMPEDANCE SYSTEMS

- COSTITUITI DA ELEMENTI A **LOOP**
  (2÷16)

- COSTITUITI DA ELEMENTI A **BEVERAGE**
  (NON LIMITATO)
VARIETÀ DI RECEVENTI ANTENNE

ANTENNE ROTANTI PER 160-80:

- **WALLER FLAG**
- **HORIZONTAL AND VERTICAL POLARIZATION**
- **30 METERS MINIMUM TOWER HEIGHT**
- **HEAVY DECUPLING OF ANYTHING NEARBY**
Most of the antennas used nowadays was developed last century, pre World War II for militaries.

Beverages, terminated loops and verticals in all of its variants is basic bricks of today's receive array technologies.
ANTENNE RICEVENTI

LAST CENTURY PATENTS:

BEVERAGE

100 YAERS TO BE MARKED PRETTY SOON!
ANTENNE RICEVENTI
LAST CENTURY PATENTS:
TERMINATED LOOP BY MR BEVERAGE!
ANTENNE RICEVENTI

BEVERAGE TODAY:

• CLASSICA SINGOLO FILO
• BEVERAGE A TERRA (BOG)
• BI – DIREZIONALE CON 2 FILI
• BI – DIREZIONALE CON CAVO COASSIALE
• BI – DIREZIONALE A TERRA (BOG)
• SINGOLA USHITA, DOPPIA USHITA
ANTENNE RICEVENTI

- CLASSICA SINGOLO FILO
- BEVERAGE A TERRA (BOG)

BEVERAGE:
ANTENNE RICEVENTI

• BI – DIREZIONALE CON CAVO COASSIALE

• BI – DIREZIONALE CON CAVO COASSIALE TERRA (BOG)
ANTENNE RICEVENTI

• BI – DIREZIONALE CON 2 FILI

BEVERAGE:
ANTENNE RICEVENTI

• BI – DIREZIONALE CON CAVO COASSIALE E DOPPIA USCITA

BEVERAGE:
ANTENNE RICEVENTI

SYSTEMI IN FASE:

- COMBINA LE USCITA DI PIU E ANTENNE:
  - AUMENTA USCITA DI ANTENNE
  - MIGLIORE PERFORMANCE

- COSTITUITI DA ELEMENTI A BEVERAGE

- COSTITUITI DA ELEMENTI VERTICALI

- COSTITUITI DA ELEMENTI A LOOP
ANTENNE RICEVENTI

- Broadside
- Staggered
- A pair at different direction and combined with/without phase shift

Beverage arrays,
Singole/multiple direzioni

- Designed, patented last century also
ANTENNE RICEVENTI

BEVERAGE ARRAYS, SINGOLE/MULTIPLE DIREZIONI

3 X 2BV STAGGERED, 320 M. TO US

ELECTRYCALLY ROTABLE PATTERN TO COMPENSATE SKEWING
ANTENNE RICEVENTI

• COSTITUITI DA ELEMENTI VERTICALI
  ▪ RISONANTI A LARGA BANDA

• COSTITUITI DA ELEMENTI A LOOP
  ▪ LARGA BANDA

4 SQUARE ARRAY

• A PICCOLA DIMENZIONE A 20 X 20 METRI

4 DIREZIONI

• DIFFERENZA DI FASE E DI SCHEMA
ANTENNE RICEVENTI

4 SQUARE ARRAY
COSTRUITI DA ELEMENTI VERTICALI

4 DIREZIONI
ANTENNE RICEVENTI

4 SQUARE ARRAY COSTRUITI DA ELEMENTI VERTICALI

4 DIREZIONI
4 SQUARE ARRAY

COSTRUITI DA 8 ELEMENTI LOOP

4 DIREZIONI, CON MIGLIORIAMENTI DI AVANTI E INDIETRO F/B, F/S
4 SQUARE ARRAY

COSTRUITI DA 8 ELEMENTI LOOP

4 DIREZIONI, CON MIGLIORIAMENTI DI AVANTI E INDIETRO F/B, F/S
4 SQUARE ARRAY

COSTRUITI DA 8 ELEMENTI LOOP
ANTENNE RICEVENTI

• CHECK YOUTUBE VIDEOS BY UROMC HOW IT WORKS

4 SQUARE ARRAY

COSTRUITI DA 8 ELEMENTI LOOP
ANTENNE RICEVENTI

8 CIRCLES:

- Costituiti da elementi VERTICALI
- Costituiti da elementi a LOOP
- 60÷100 metri di diametro rotondo
- Differente fasi e schema:
  - BSEF
  - HI-Z SYSTEM

8 Direzioni,
Con miglioramenti di avanti e indietro F/B, F/S
ANTENNE RICEVENTI

8 CIRCLES:

8 DIRIEZIONE,

DI ANTENNE VERTICALI
ANTENNE RICEVENTI

8 CIRCLES:

8 DIRIEZIONE, DI ANTENNE

LOOP K-98
COSA TI SERVE:

- REMOTE RELAY SWITCH DISTRIBUTION SYSTEM FOR SO2R, M/S, MM
- CONTROL CONSOLE
- BAND PASS FILTERS MUST FOR FOR SO2R, M/S, MM
- PREAMPLIFIERS
- SOME KIND OF PROTECTION OFF YOUR OWN SIGNAL
- PROTECTION AGAINST LIGHTNING
SE TU HAI ANTENNE RICEVENTE

FAI QUESTO:

ISOLATION IN A SWITCHING SYSTEMS

• OF DIFFERENT RECEIVE ANTENNA SWITCHES

• TRANSMIT / RECEIVE ANTENNAS SWITCH IN A RIG
ISOLATION IN A SWITCHING SYSTEMS!

FAI QUESTO:

• PROBLEM EXISTS BETWEEN A RELAY SWITCH ISOLATION AND DIRECTIVE ANTENNA F/S F/B
• RELAYS ISOLATION IS IN -50DB RANGE
• F/B AND F/S IS ON ORDER OF -30DB
• LOOKS LIKE WE HAVE A SAFETY MARGIN OF 20DB...
REMEMBER:

DIFFERENT RX ANTENNAS HAS DIFFERENT OUTPUT LEVELS, IT CAN BE 20DB!

TX ANTENNAS HAS OUTPUT LEVEL OF +20DB TO A AN AVERAGE RX ANTENNA!

THIS “EXTRAS” UP TO 40DB CAN DESTROY AL OF YOUR NICE ANTENNA PROPERTIES
PREAMPLIFICATORE SEMPLICE

FILTRRO PASSA ALTO

ANCHE PER SINGOLA BANDA BPF

• 75 O 50 OHME SYSTEMA

• CONNETTORI UHF O F

• +12DB OR +18DB

• 15VDC VIA COAX O SU LINEA SEPARATA
CONTROLLO PER

PREAMPLIFICATORE SEMPLICE

• 75 O 50 OHME SYSTEMA
• CONNETTORI UHF O F
• 15VDC VIA COAX
COMMUTATORE D'ANTENNA CON FILTRO PASSA ALTRO E PREAMPLIFICATORE

4 INPUTS;

PREAMPLIFICATORE : +18DB;

INPUT STAGES

PROTECTION DURING TX;
COMMUTATORE DI ANTENNE

8 INPUTS;

BCD CONTROLLED DIRECTION SWITCH;

INPUT STAGES PROTECTION DURING TX;
COMMUTATORE D'ANTENNA CON BPF E PREAMPLIFICATORE

8 INPUTS, 75 O 50 OHME SYSTEMA

• CONNETTORI UHF O F;

BANDPASSFILTERS: 160 - 80 - 40 METERS BANDS;

PREAMPLIFIERS: NORTON DESIGN, 2 X 12DB GAIN;

INPUT SATGES PROTECTION DURING TX;
CONTROLLER PER
PREAMPLIFICATORE
CON BPF E
PREAMPLIFICATORE
PULSANTIERE DI CONTROLLORO
PERSONALIZZABILI PER:
COMMUTATORI D’ANTENNA REMOTI, RX
ARRAYS,
SISTEMI MULTIPLI DI BEVERAGE, SISTEMI
DI DISTRIBUZIONE CON FILTRI
PASSABANDA
E PREAMPLIFICATORI RICEVITORI.
CAVO DELL'ANTENNA

• IN GENERAL CAN BE ANY IMPEDANCE:
  50, 75 OR 100 OHMS
  IT CAN BE COAX, TWINAX, BIAx

• 75 OHMS IS NOT THE BEST CHOICE …
  • HIGH QUALITY RG6 IS NOT CHEAPER THAN RG8 SERIES
  • HIGH QUALITY F CONNECTORS REQUIRES MORE EUROS AND MUST BE ONLY COMPRESSION TYPE
  • NEVER EVER USE CCS (BARE COPPER COVERED STEEL CONDUCTOR)
    (-9DB 100 METERS AT 1.8MHZ)
  • AND RECEIVER IMPEDANCE IS NOT 75 OHMS …
FILTRO DI MODO COMUNE

SICURAMENTE NECESSARIO
TRANSFORMER 50/75
FOR PERFECTIONISTS
• MY NEIGHBOR CAN COPY SOME ONE, I DON'T HEAR AT ALL ON MY BEVERAGE!

• 100÷200 KM AND PROPAGATION IS DIFFERENT!

• BUILD A BETTER RX ANTENNA!

• WEB SDR?

• MY BEVERAGE SWR IS 1:1,7 ON 1950KHZ, HOW CAN I CHANGE IT ?

• BEVERAGE IS NON RESONANT ANTENNA, SHOULD BE MATCHED IN A FREQ RANGE, NOT ON A FREQUENCY OF INTEREST
THANK YOU VERY MUCH FOR YOUR ATTENTION!

SPASIBO TO STEFANO BRIOSCHI - IK2QE1 FOR INVITATION!

DE RA6LBS