

IP Based GMDSS Webinar

11:00 am CET



Agenda

- Introduction
- Terrestrial GMDSS
- Leveraging standards
 - IP protocols
 - ED137B & SIP
- Live Demonstration: GMDSS Server
- Questions and answers

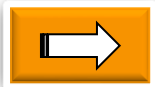


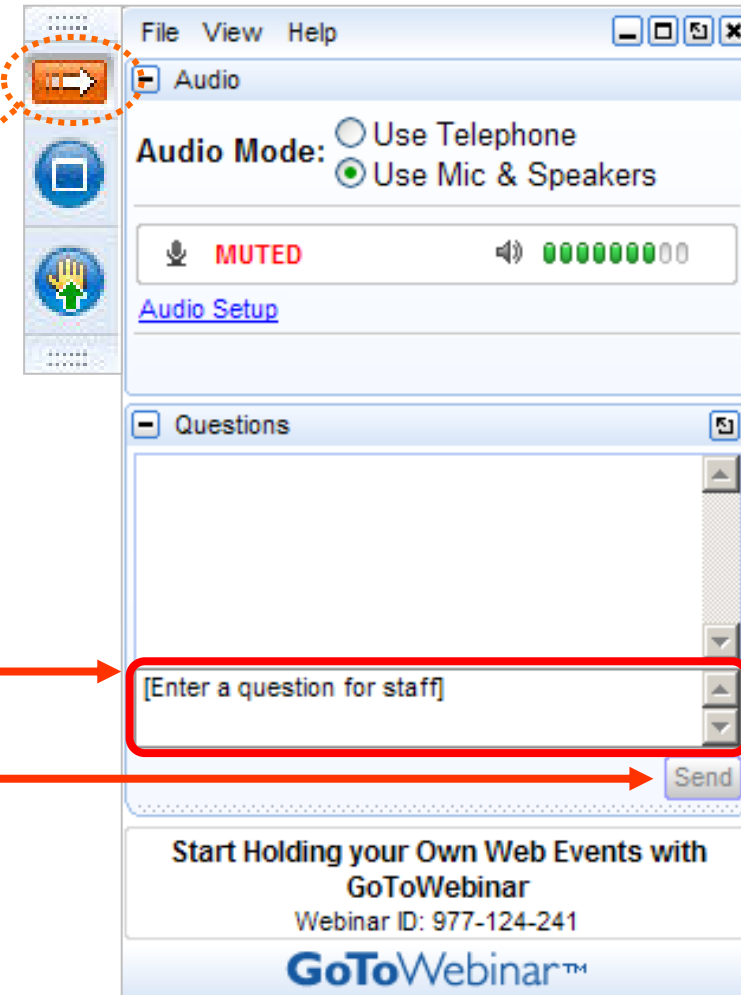
Hermann ZENSEN
Sales & Marketing



Marc DUMONT
R&D

Questions & Answers

Click on  to open/close webinar panel



File View Help

Audio

Audio Mode: Use Telephone Use Mic & Speakers

MUTED Speaker icon and volume level

[Audio Setup](#)

Questions

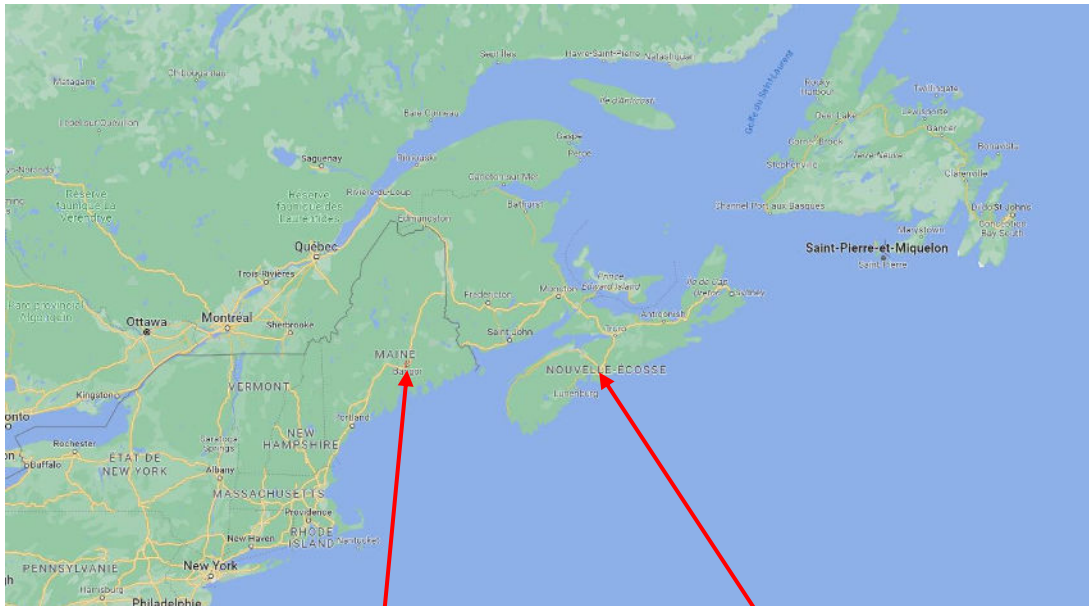
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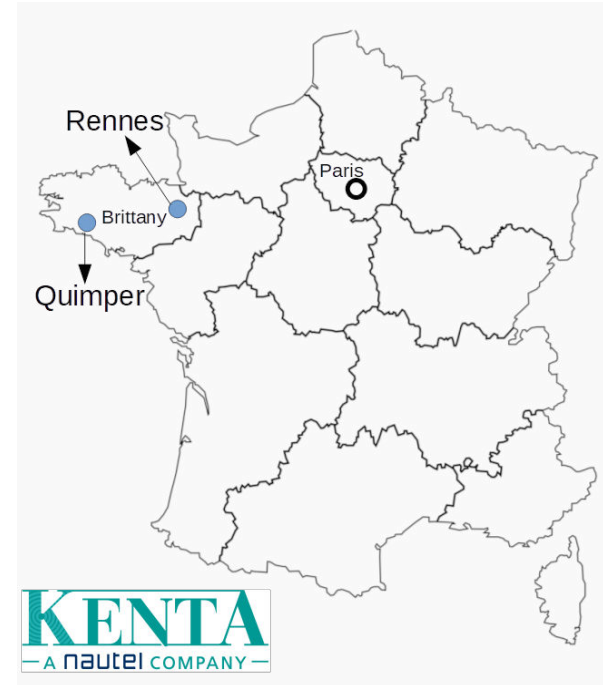
Enter questions here
...then press **Send**

KENTA Technologies & NAUTEL: Shared passion for maritime communications



Nautel Bangor
Maine, US

Nautel HQ
Halifax, Canada



Kenta
Technologies

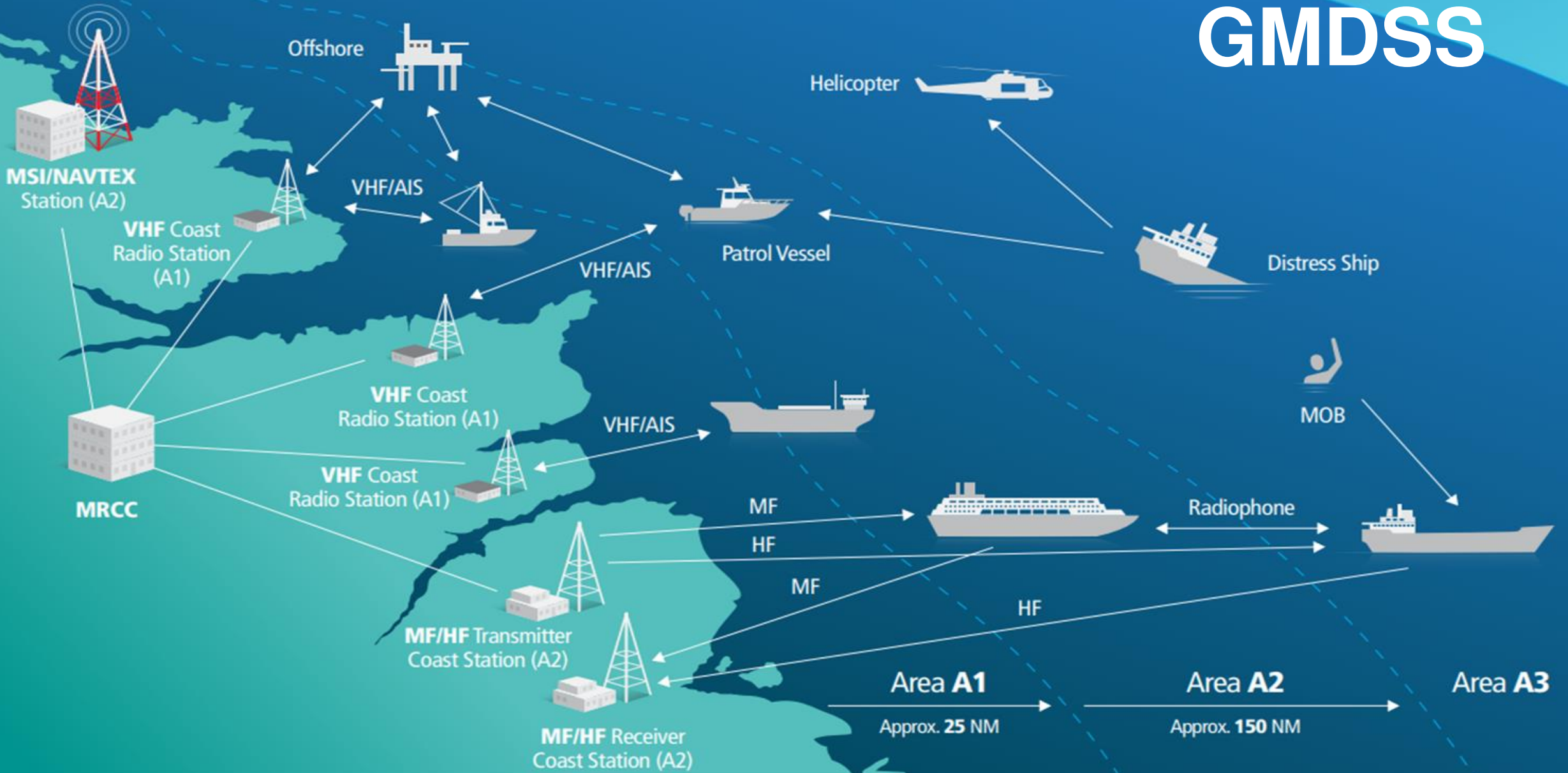


KENTA Technology Key Points

- Nautel's European subsidiary since February 2021
 - Part of a 200+ employee, 54 year RF and communications innovator, with outstanding financial stability.
- Founded in 1990 as a Furuno spin off with focus on maritime communications
- GMDSS since 2013
- Software and hardware completely developed internally
- Key competences:
 - IP Technologies
 - Radiocommunications (MF, HF, VHF)
 - Strong field experience for frequencies MF/ HF (less than 30 MHz)
 - Software defined Radio

Terrestrial GMDSS

Area A4
beyond 76° N or 76° S (no satellite coverage)

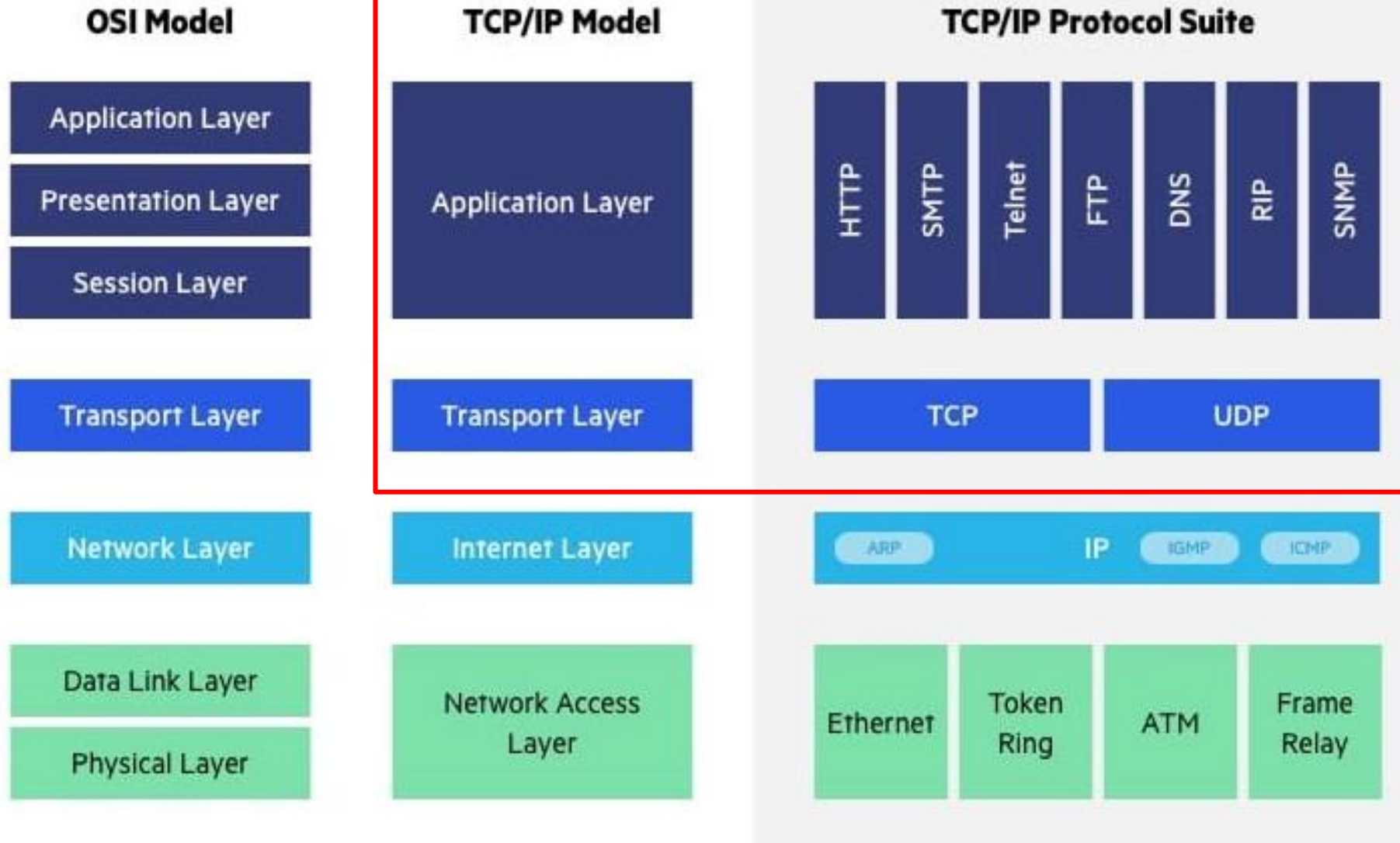


Leveraging Standards: IP Standards

- All industries leveraging IP standards today:
 - Remote control, configuration, update
 - Easy maintenance
 - Easy monitoring
 - Less cables, compact racking
 - Today's IP networks have high bandwidth
 - Ideal for unmanned site and remote operation
 - Standards to be discussed:
 - HTTP, FTP, RTP, SIP, ED137



Internet Protocol Layers



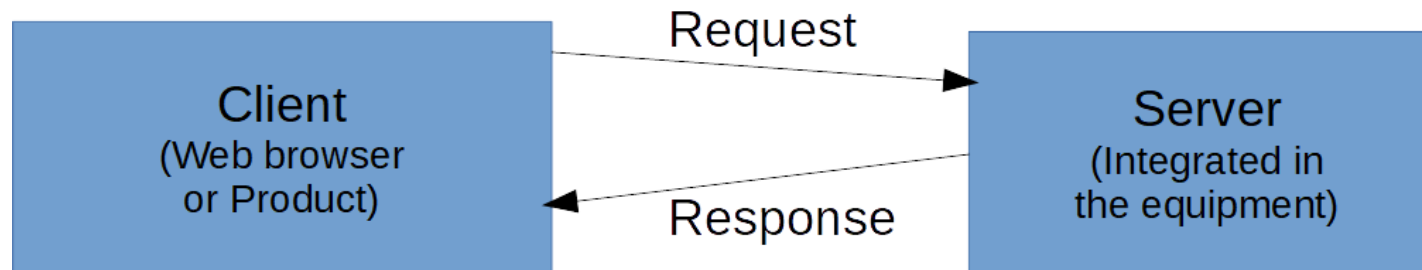
HTTP Protocol



- The Hypertext Transfer Protocol (HTTP)
 - Application layer protocol
 - Enables distributed, collaborative, hypermedia information systems.
 - Foundation of data communication for the World Wide Web
 - Hypertext documents include hyperlinks to other resources that the user can easily access by a mouse click

HTTP Protocol

- Very popular (all web sites!)
 - Well-documented / analyzable with tools like Wireshark
- Client / Server oriented (connected)
 - Request from client expects server response
 - Polling
- Mainly exchanging XML Data format
- Compressible (GZIP)
- Fast (with Keep-Alive support)



HTTP Protocol Example

- **GMDSS utilization:**

- Monitoring and Control
- Set/Get Frequency
- *Get Status/Alarms

Request

```
GET /hello.htm HTTP/1.1
User-Agent: Mozilla/4.0 (compatible; MSIE5.01; Windows NT)
Host: www.tutorialspoint.com
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Connection: Keep-Alive
```

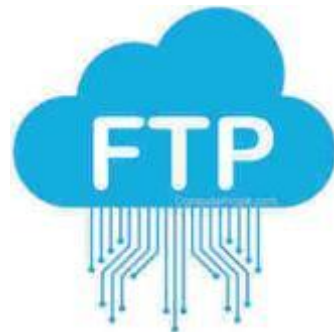
Response

```
HTTP/1.1 200 OK
Date: Mon, 27 Jul 2009 12:28:53 GMT
Server: Apache/2.2.14 (Win32)
Last-Modified: Wed, 22 Jul 2009 19:15:56 GMT
Content-Length: 88
Content-Type: text/html
Connection: Closed
```

```
<html>
<body>
<h1>Hello, World!</h1>
</body>
</html>
```

FTP - Protocol

- File Transfer Protocol (FTP)
 - transfers files from a server to a client on a computer network.
- Built on a client–server model architecture
 - separate client & server, control & data connections.
- Users may authenticate themselves with clear-text sign-in
 - normally in the form of a username and password.



FTP Protocol

- File transfer oriented (file name is also transferred)
- Like HTTP: Client/server, request/response, polling
- Dual communication channel (session & data separately)
- Mainly exchanging XML Data format
- No compression / Not so fast



- **GMDSS utilization:**
 - NAVTEX/DSC Data Exchange
 - Polling of RX messages
 - Push TX messages to be transmitted

FTP Protocol Example

Simplified Version with FTP client

```
Connected to ftp.nautel.com
220 bruno FTP server (SunOS 4.1) ready.
Name (ftp.nautel.com:yourlogin): anonymous
331 Guest login ok, send ident as password.
Password: ***
230-This server is PURE-FTPd
230 Guest login ok, access restrictions apply.
ftp> cd /pub/HPSC
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 ASCII data connection for /bin/ls (128.138.242.10,3133) (0 bytes).
File1.xml
File2.xml
226 ASCII Transfer complete.
418 bytes received in 0.043 seconds (9.5 Kbytes/s)
ftp> get File1.xml
200 PORT command successful.
150 ASCII data connection for File1.xml (128.138.242.10,3134) (2881 bytes).
226 ASCII Transfer complete.
2939 bytes received in 0.066 seconds (43 Kbytes/s)
ftp> bye
221 Goodbye.
```

Identification with User And Password

Change directory

List

Get the File "File1.xml"

Close.Bye

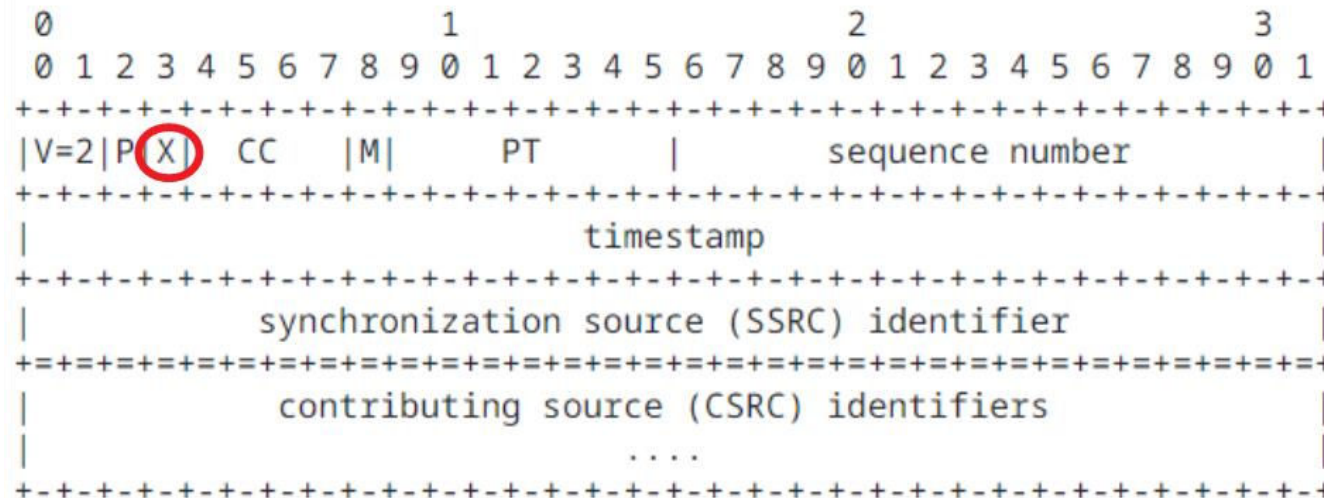
RTP – Real Time Protocol

- Real-time Transport Protocol (RTP)
 - Transport layer protocol
 - Delivers audio and video over IP networks
 - Typically runs over User Datagram Protocol (UDP).
- One of the technical foundations of Voice over IP
 - Often used in conjunction with a signaling protocol
 - For example:
 - Used with the Session Initiation Protocol (SIP) which establishes connections across the network



RTP – Real Time Protocol

- Used over UDP (datagrams / no connection)
- Can transport anything
 - such as audio PCM/G711/G729 and ED137 controls for transceivers
- Timestamped
- Additional Forward Error Correction (FEC) possible
 - (Packet Loss prevention)



X = Extension flag.
Used for ED137

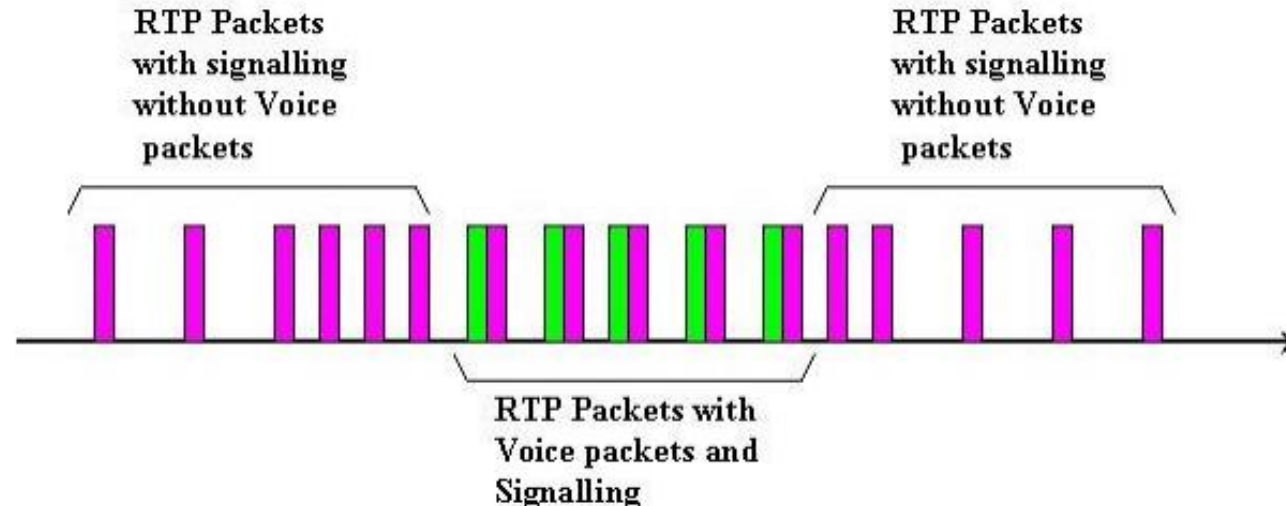
Leveraging Standards: ED137

- ED137:
 - Open protocol for air traffic management control centers
 - Easy Integration of equipment from different suppliers
 - Standardized Audio encoding: G711
 - Interoperability

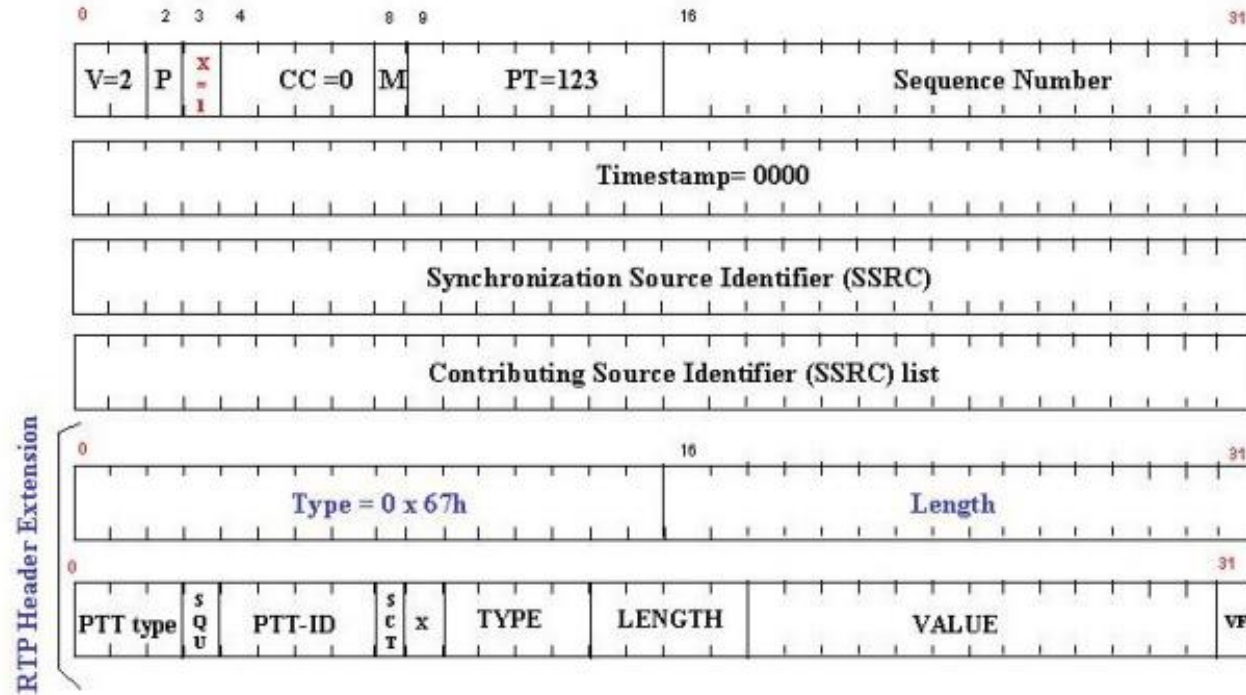


Leveraging Standards: ED137

- Use of SIP for establishing sessions between 2 pieces of equipment
 - SIP Version 2.
- Additional RTP header provides extra real-time information (with each audio packet)
 - PTT for transmitter
 - SQUELCH for receivers
 - No audio transported when there is no communication at all
 - R2S Keep-Alive packets missing in SIP standard (no network link status monitoring)
 - Keep Session Open



Leveraging Standards: ED137



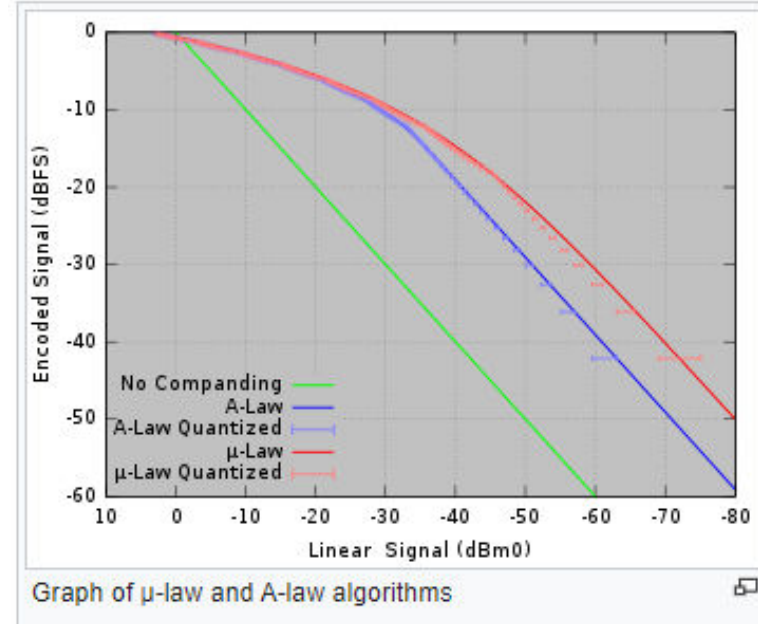
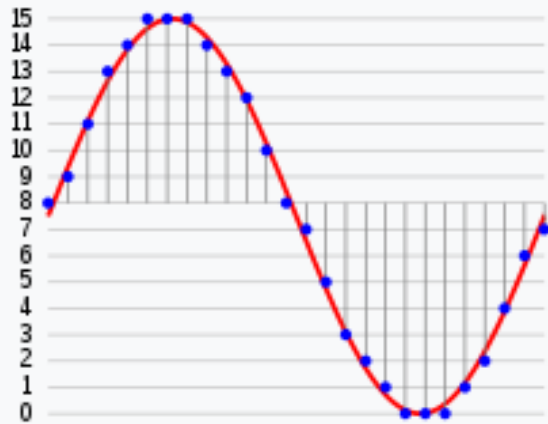
Modified RTP header with ED137 information

- **GMDSS utilization:**
 - All audio exchanges for transmitting/receiving

G711 Audio Encoding

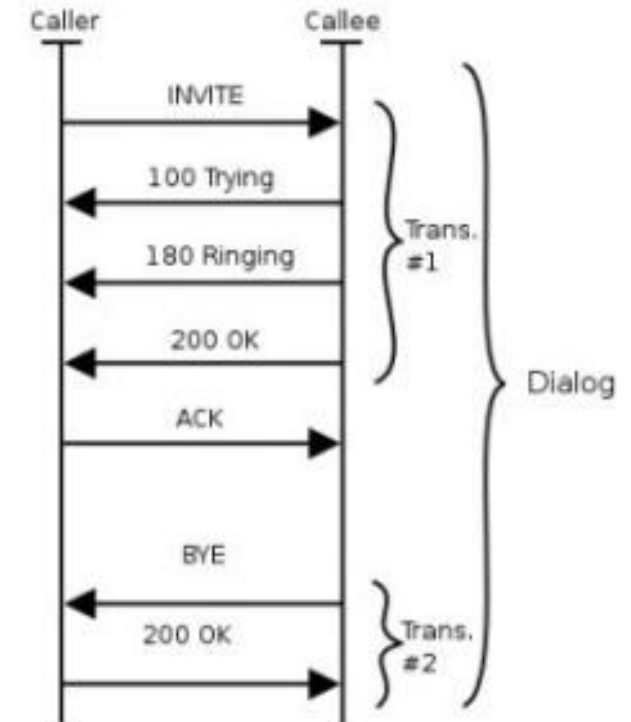
- 8-bit PCM Based
- Quantization μ -Law (majorly U.S. and Japan) or A-Law
 - (Generic ; also called 'PCMA' like we use for phony)
- Used in mono/8kHz for voice
- Bitrate: 8Khz*8bit = 64 kbit/s

Pulse code modulation (PCM) of voice frequencies



Leveraging Standards: SIP - Protocol

- Session Initialization Protocol (SIP)
 - Used in Internet telephony, in private IP telephone systems, mobile phone calling over LTE
 - Signaling protocol for RTP (Application Layer)
 - initiates, maintains, and terminates communication sessions
 - voice, video and messaging applications
- Text based peer to peer protocol,
 - includes elements of HTTP and SMTP
- Describes future RTP/Audio session
 - Session Description Protocol (SDP) carried as payload in SIP messages
 - No further exchanges when RTP stream has started
- Independent of the transport layer:
 - Can be used with TCP and UDP



SIP Protocol – Wireshark Capture

IP Source
and
destination

SIP
Message
Body

Bit per bit

The image shows a Wireshark network traffic capture. The top pane displays a list of packets, with the first four being SIP messages: INVITE, Trying, OK, and ACK. The middle pane shows the expanded details of the first packet (Frame 68721), which is an INVITE message. The bottom pane shows the hex and ASCII representation of the SDP body. A pop-up window titled 'Wireshark · Session Description Protocol (sdp) · LAN1' is overlaid on the right, showing the SDP text in ASCII format.

No.	Time	Source	Destination	Protocol	Length	Info
68721	133.961533	10.64.5.230	10.64.4.162	SIP/SDP	736	Request: INVITE sip:user@10.64.4.162
68723	133.962742	10.64.4.162	10.64.5.230	SIP	354	Status: 100 Trying
69385	135.115780	10.64.4.162	10.64.5.230	SIP/SDP	820	Status: 200 OK (INVITE)
69398	135.149524	10.64.5.230	10.64.4.162	SIP/SDP	631	Request: ACK sip:10.64.4.162@10.64.4.162

```
> Frame 68721: 736 bytes on wire (5888 bits), 736 bytes captured (5888 bits) on interface \Device\NPF_{804A6649-67D4-4273-A1FA-6A446A42F955}, id 0
> Ethernet II, Src: VMware_d6:af:1f (00:0c:29:d6:af:1f), Dst: Itis_10:01:6a (00:90:87:10:01:6a)
> Internet Protocol Version 4, Src: 10.64.5.230, Dst: 10.64.4.162
> User Datagram Protocol, Src Port: 5050, Dst Port: 5060
< Session Initiation Protocol (INVITE)
  < Request-Line: INVITE sip:user@10.64.4.162 SIP/2.0
  < Message Header
  < Message Body
    < Session Description Protocol
      Session Description Protocol Version (v): 0
      > Owner/Creator, Session Id (o): admin 0 0 IN IP4 10.64.5.230
      Session Name (s): 4013_162-RTX
      > Connection Information (c): IN IP4 10.64.5.230
      > Media Description, name and address (m): audio 53000 RTP/AVP 0
      Media Attribute (a): sendonly
      > Media Attribute (a):ptime:30
      > Media Attribute (a):interval:30ms
      [Generated Call-ID: 85a57180-8167-123c-2680-39a48cb53b8d]
      [Generated Call-ID: 946753df-8167-123c-2680-39a48cb53b8d]
      [Generated Call-ID: a2cd0852-8167-123c-2680-39a48cb53b8d]
      [Generated Call-ID: b134305c-8167-123c-2680-39a48cb53b8d]
      [Generated Call-ID: bf9badf4-8167-123c-2680-39a48cb53b8d]
      [Generated Call-ID: cdffbc5c-8167-123c-2680-39a48cb53b8d]
```

```
v=0
o=admin 0 0 IN IP4 10.64.5.230
s=4013_162-RTX
c=IN IP4 10.64.5.230
m=audio 53000 RTP/AVP 0
a=sendonly
a=ptime:30
a=interval:30ms
```


Frame 68721, Session Description Protocol (sdp), 141 bytes.
Decode as: None Show as: ASCII Start: 0 End: 141
Find: Find Next
Print Copy Save as... Close Help

SDP
Information

IP Standards Implementation Example

KENTA Solution Step by Step

KENTA IP Solution




G711
Encoder and Decoder

Audio Console



DSC Console




Navtex Console



Audio Archiver

G711
Encoder and Decoder
for audio Archiving

GMDSS SERVER



SNMP

NTP

SNMP

KVHF-4013
VHF Transceiver

G711 Encoder and Decoder

DSC Encoder and Decoder

SNMP

KTX-2012
MF/HF Transmitter

G711 Decoder

DSC and NAVTEX Encoder

SNMP

KRX2072
MF/HF Receiver

G711 Encoder

DSC and NAVTEX Decoder

SNMP

KNAVTEX-5221
Navtex Modulator

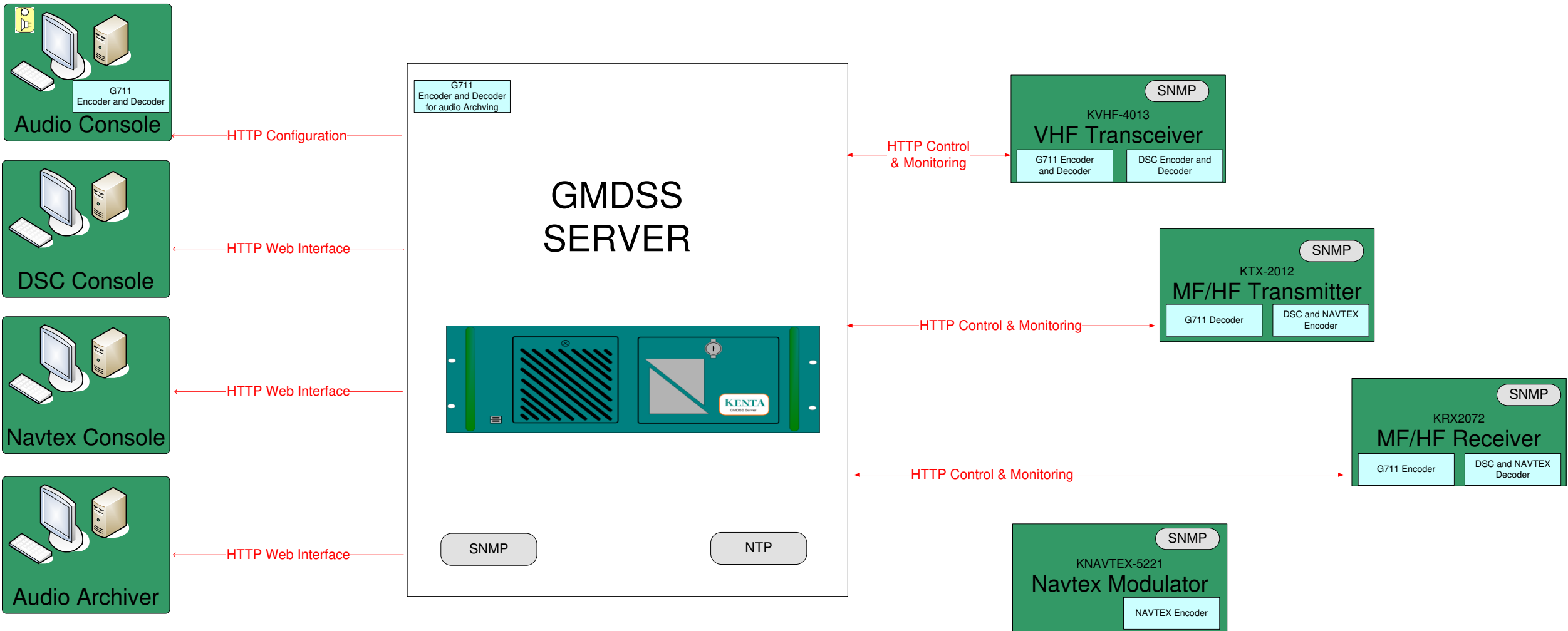
NAVTEX Encoder



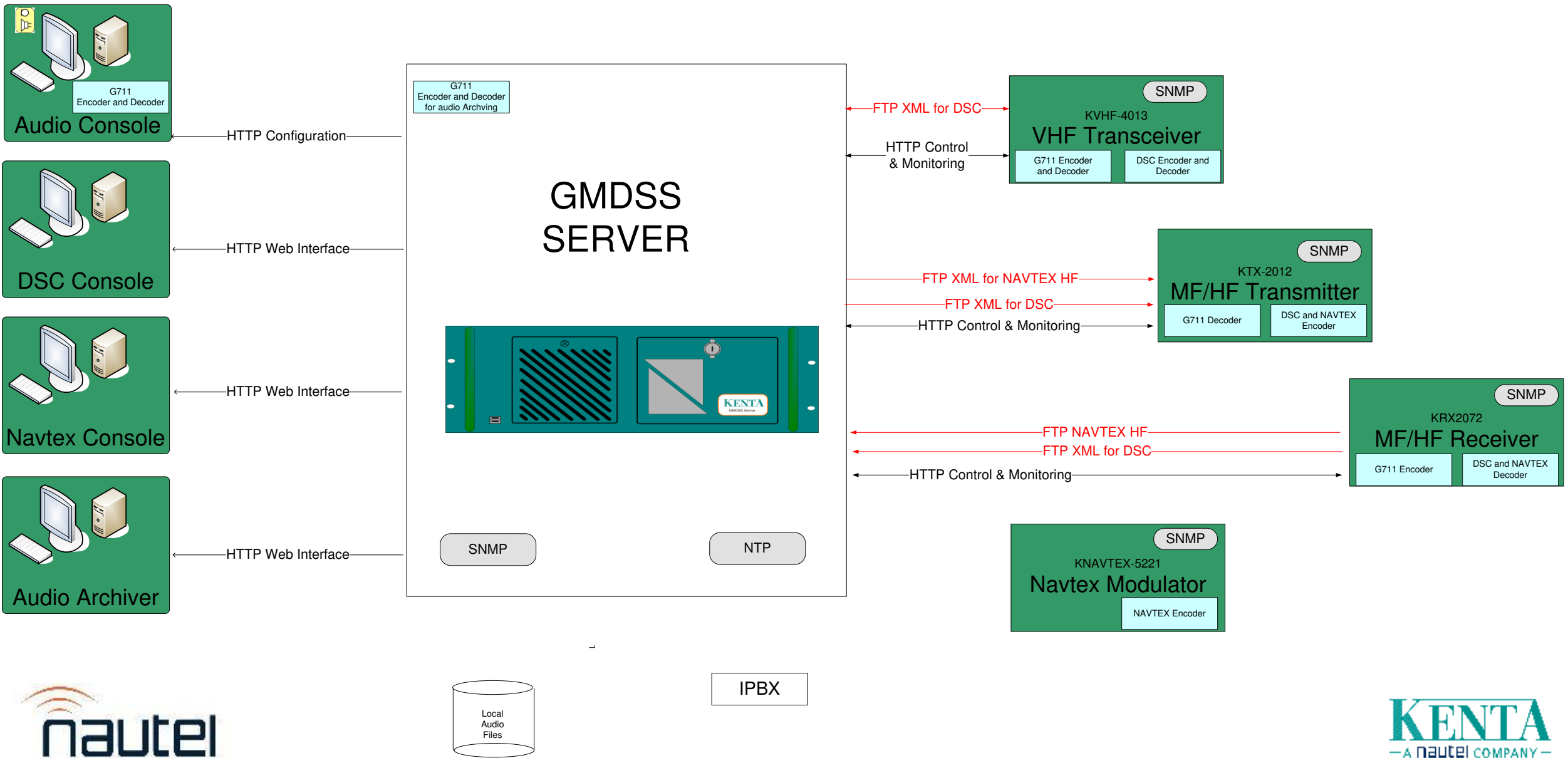
IPBX



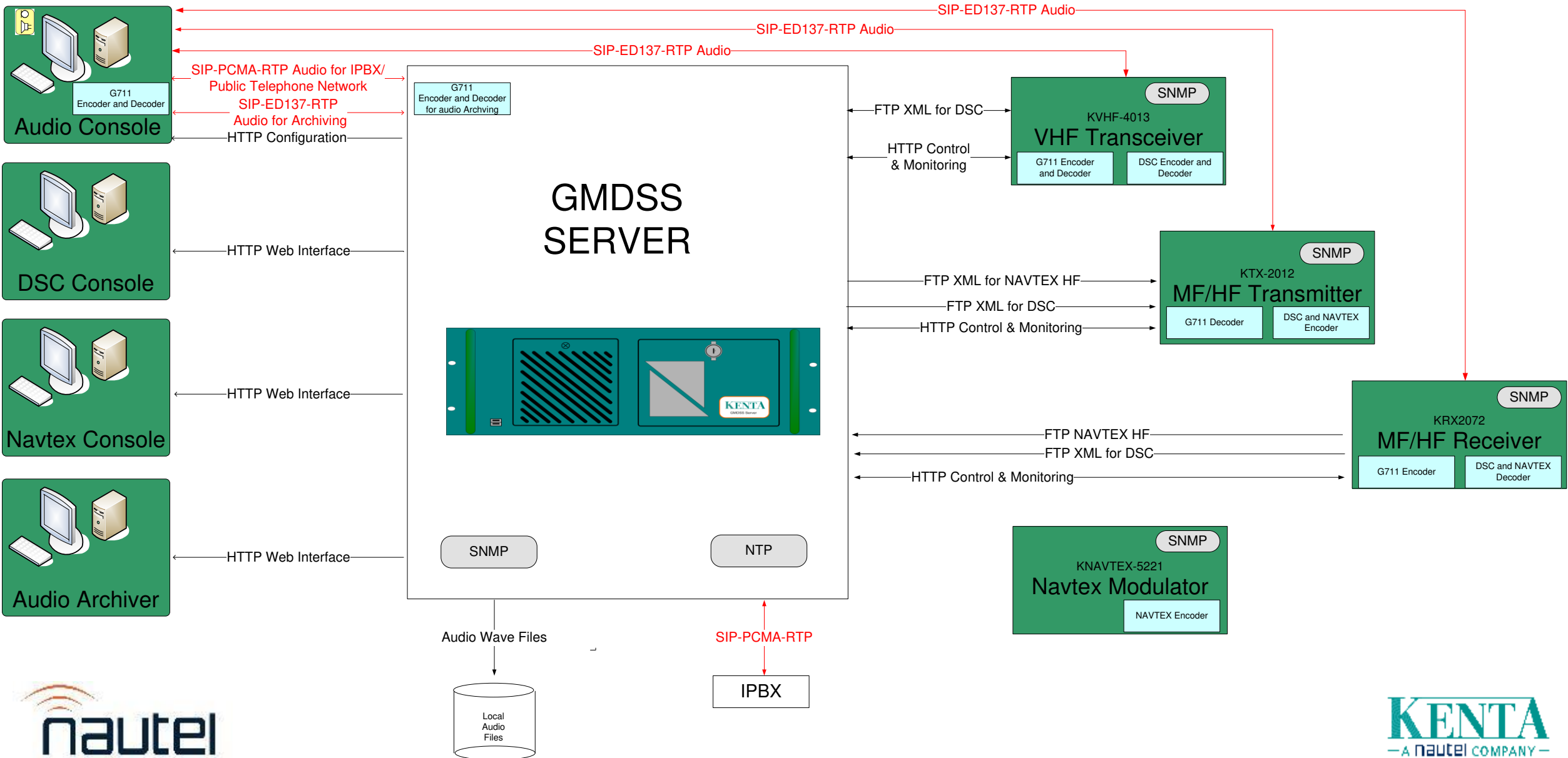
KENTA IP Architecture with HTTP only



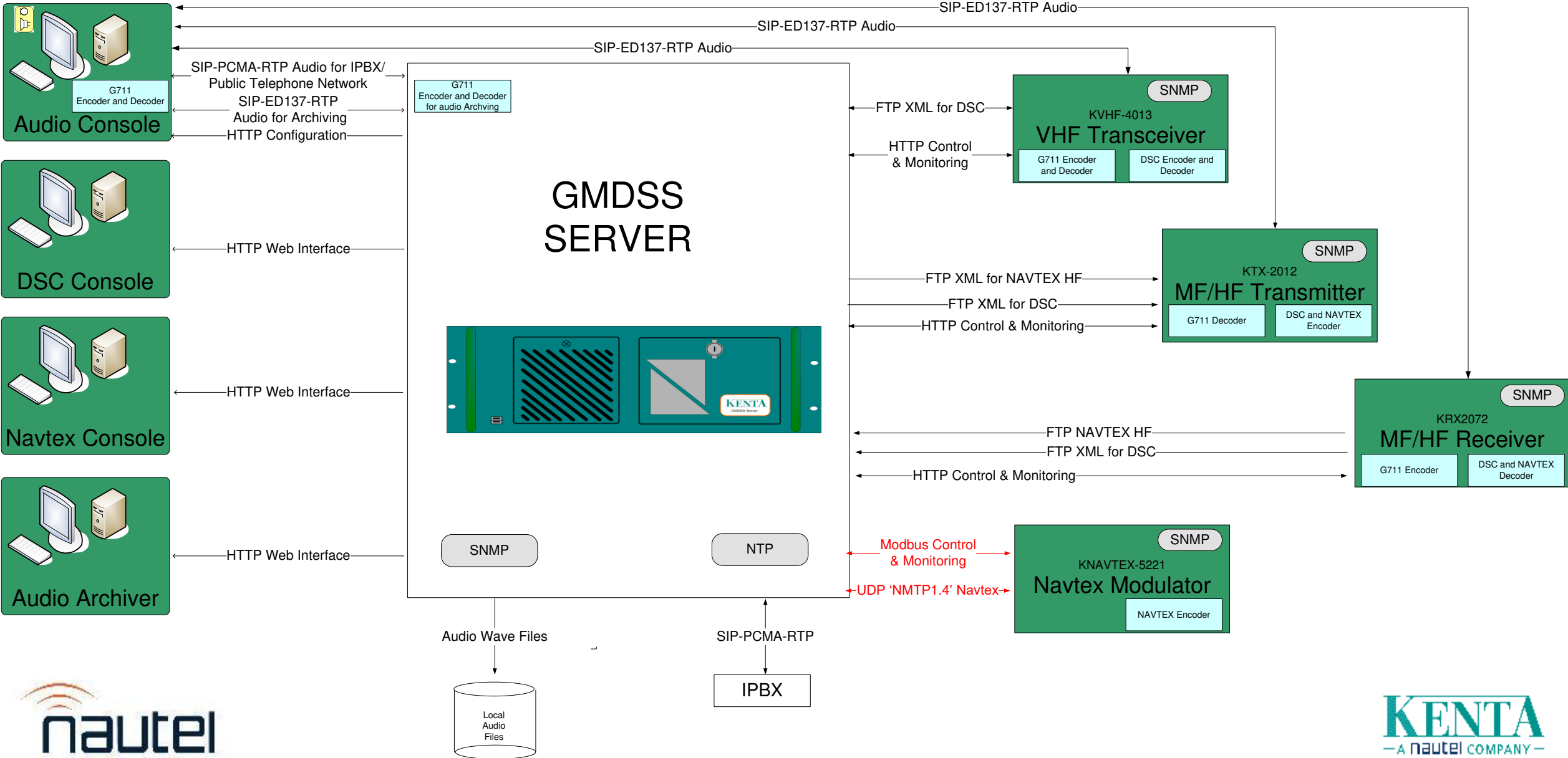
KENTA IP Architecture with HTTP and FTP



KENTA IP Architecture with HTTP, FTP and ED137B



KENTA IP Architecture: Complete IP Implementation



DEMONSTRATION

Standards and IP in action



KENTA Nautel GMDSS Equipment



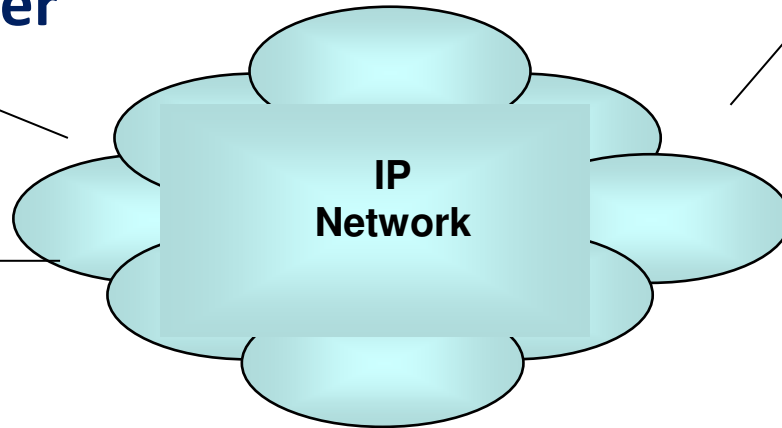
VHF Transceiver



MF/HF and Navtex RX



Navtex Transmitter

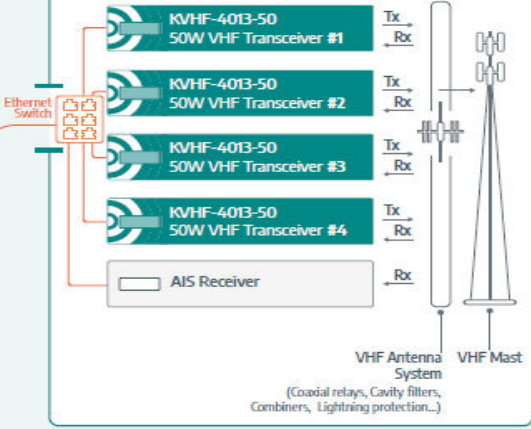


GMDSS Server

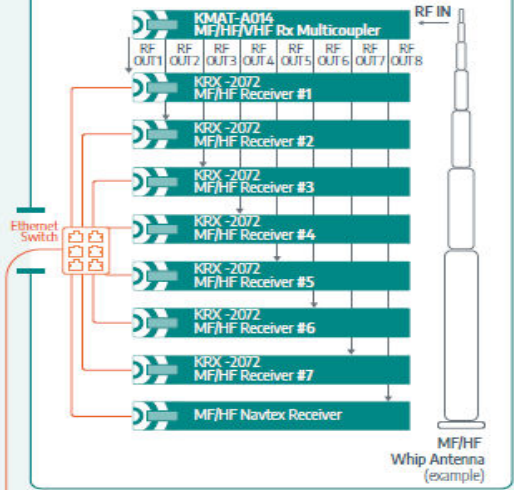


MF/HF TX

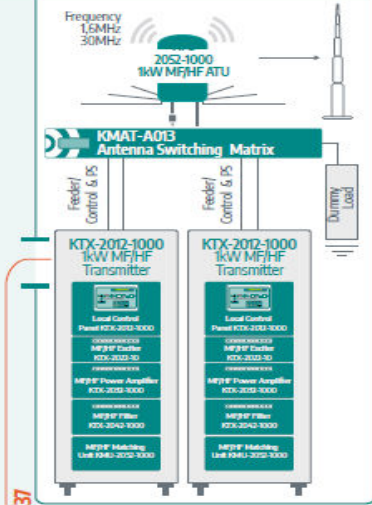
VHF Coastal Station



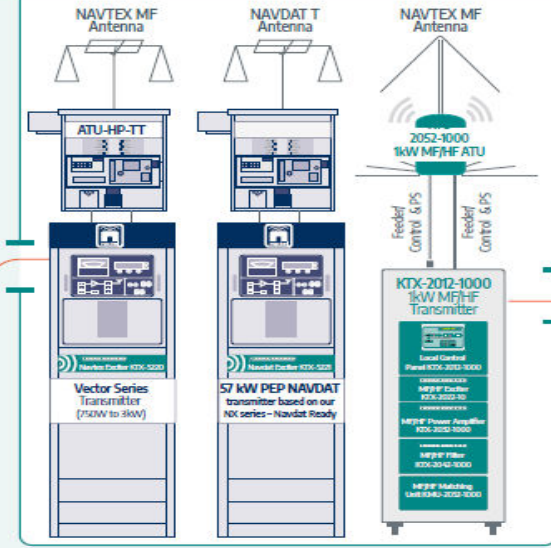
MF/HF Rx Coastal Station



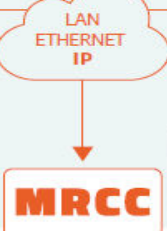
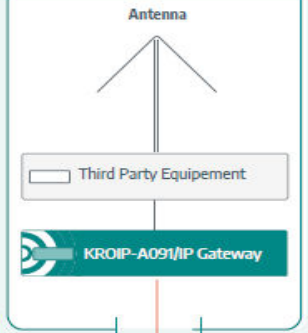
MF/HF Tx Coastal Station



NAVTEX/NAVDAT Coastal Station

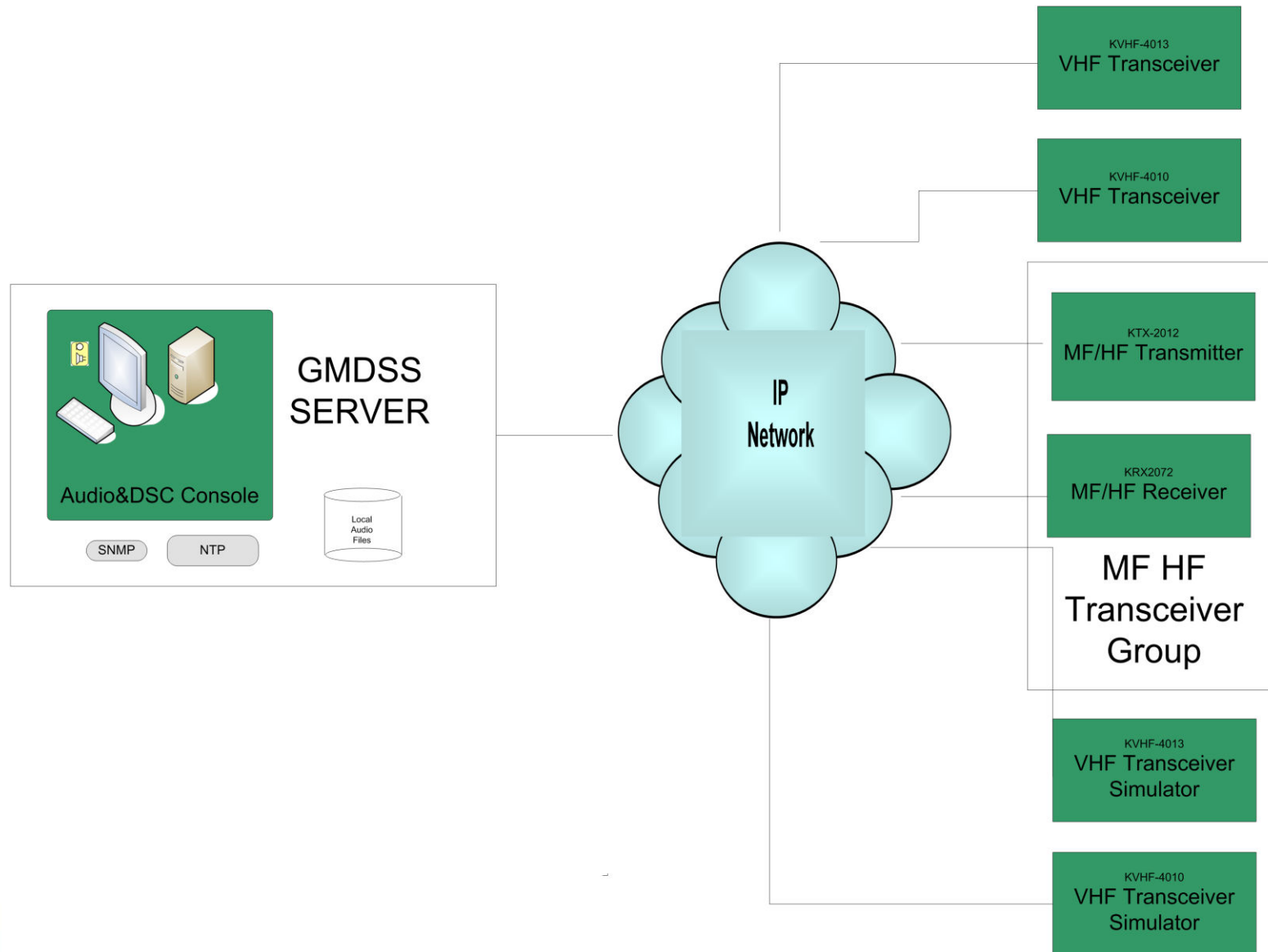


THIRD PARTY TX RX Coastal Station



Global Overview **KENTA** Nautel **GMDSS** Solution

Demonstration System:



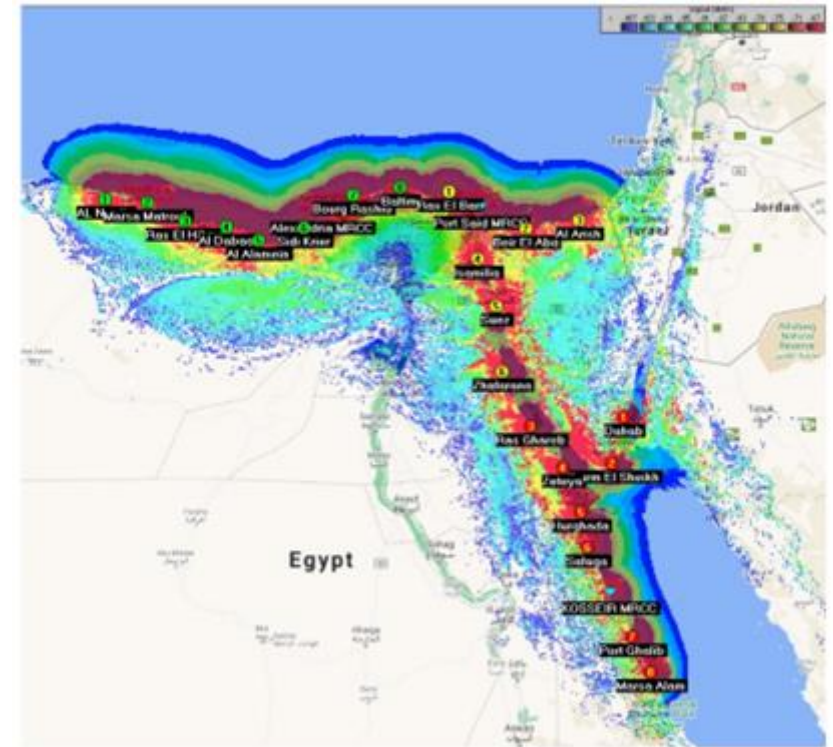
Summary:

- IP networks are ideal for GMDSS Systems
 - Increased bandwidth, easy configuration, analysis tools
- Modern IP based GMDSS Systems:
 - Redundant, Reliable, Scalable, Flexible
 - Easy to maintain and supervise remotely
- ED137 standardization offers:
 - Open & Interoperable
 - Used by main Control Software suppliers such as Frequentis and Prescom
 - Air Traffic Systems security standards compliant
 - Easy integration of 3rd party transmitters and receivers
 - Future proof

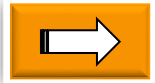


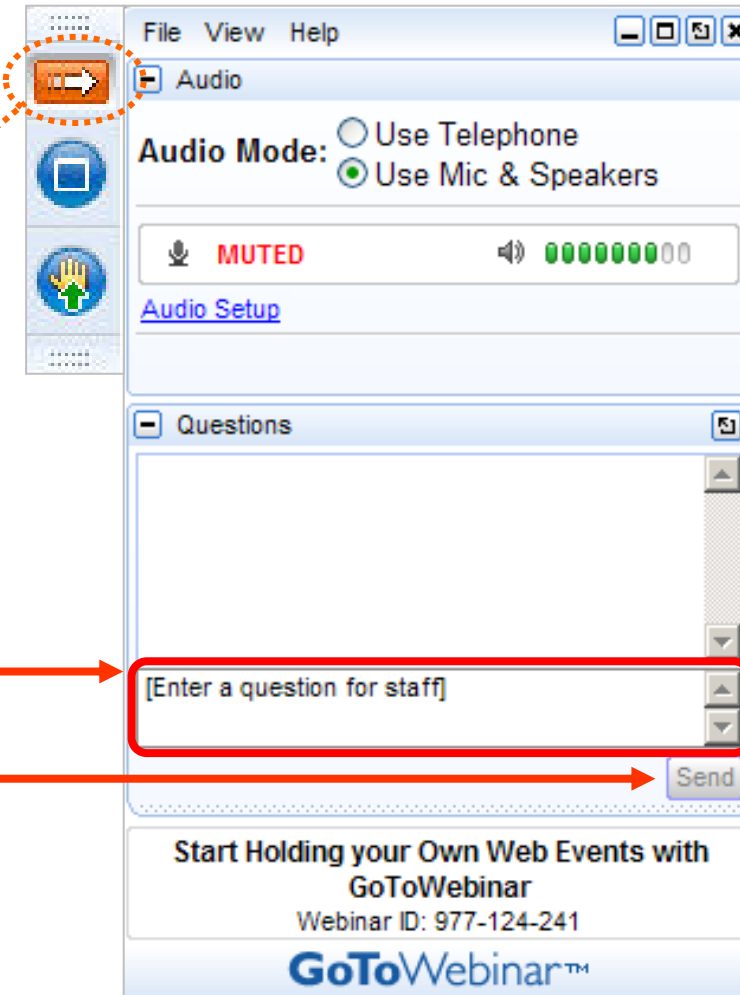
Next steps:

- Contact Kenta for advice on upcoming projects
- Email to request Egypt deployment case study
- Future webinars
 - Please share topic suggestions
 - In chat
 - In the webinar survey



Questions

Click on  to open/close webinar panel



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Enter questions here
...then press **Send**

Thank You!

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