

## LINK 11

### **TADIL A, TADIL B, MIL STD 188-203-1A, STANAG 5511, CLEW**

LINK 11 (also known as TADIL A in the US) employs netted communication techniques using standard message formats. Data is exchanged over a differential quadrature phase-shift keying modulated data link operating at a rate of 1364 (HF/UHF) or 2250 (UHF) bits per second (bps). LINK 11 is designed for operation on High Frequency (HF) ground wave and thus has a beyond line of sight (BLOS) capability (to a theoretical range of approximately 300 NM).

Link 11 can also operate in the UHF band but is then limited to LOS ranges (approximately 25 NM surface-to-surface or 150 NM surface-to-air).

As an alternative, communication media satellite and fibre optic can be used. Units which exchange data via Link 11 are designated Participating Units (PUs) or Forwarding Participating Units (FPUs). Link 11 is based on 1960s technology and is a relatively slow link which normally operates on a polling system with a Net Control Station polling each participant in turn for their data. In addition to this Roll Call mode, Link 11 may be operated in broadcast modes in which a single data transmission or a series of single transmissions is made by one participant. Link 11 is, therefore, a half duplex link. Link 11 is secure but not ECM-resistant.

Link 11 supports the exchange of air, surface and subsurface tracks, EW data and limited command data among C2 units, but does not support aircraft control nor other warfare areas.

Within the UK Link 11 is employed by the Royal Navy, Royal Marines and Royal Air Force in its Ships, Ship Shore Ship Buffers (SSSBs), E-3D AEW, Nimrod MPA, Tactical Air Control Centre (TACC), etc. Within NATO Link 11 is primarily used as a Maritime Data Link. However, Link 11 will be adapted to cater for Theatre Missile Defence information exchange requirements, consequently Ground Based SAM Systems are or will be equipped with Link 11.

Link 11B employs a dedicated, point-to-point, full-duplex digital data link using serial transmission frame characteristics and standard message formats transmitted by individual signal elements or binary digits on a time sequential basis. Data is exchanged over a fully automatic, phase-continuous, full-duplex, frequency-shift-modulated data link operating at a standard rate of 1200 bps with optional capabilities of 600 and 2400 bps (or multiples of 1200 bps, e.g. 3600, 4800, etc.) Units which exchange data via Link 11B are designated Reporting Units (RUs) or Forwarding Reporting Units (FRUs).

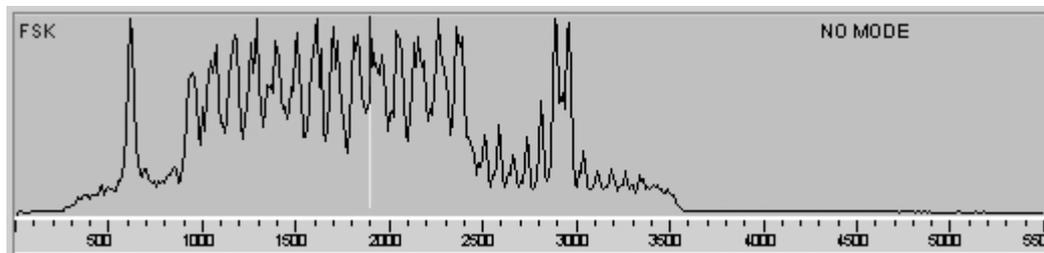
Within the UK Link 11B will be employed by the TACC, the second generation SSSBs and for ground-to-ground communications with the Iceland Air Defence System (IADS). Within NATO Link 11B is used to integrate Ground Based SAM Command and Control and Fire Distribution Centres into the Air Defence Ground Environment using CRC SAM Interfaces (CSI). Within the US, and some other NATO Nations (e.g. France), Link 11B is used as the primary data link for ground based TACS (e.g. USAF MCE, and USMC TAOC).

Message standards for both Link 11 and Link 11B are defined in STANAG 5511 while standard operating procedures are laid down in ADatP 11.

Link 11 is using 16 tones with a tone spacing of 110 Hz.

Tone number	Frequency in Hz
Doppler tone	605
1	935
2	1045
3	1155
4	1265
5	1375
6	1485
7	1595
8	1705
9	1815
10	1925
11	2035
12	2145
13	2255
14	2365
Synchronisation	2915

**Table 26: LINK 11 frequencies**



**Picture 96: Spectrum of a LINK 11 transmission**

All tones are sent at the same time and are giving the typical sound of Link 11. Except the tones for synchronisation and doubler all tones can independently be modulated. The data rate for the slow mode is 1364 Bit/s and for the fast mode 2250 Bit/s. The data packets are similar to X.25 but have a better error correction and data throughput.