

# Course: DD Leaky Feeder System

## Module 3.1: Fundamentals



**RFI**  
TECHNOLOGY SOLUTIONS



# Overview

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## What is DD LFS?

### Pre-requisite courses

1. Digital Drift Conventional
2. Leaky Feeder LineAmp

DDLFS combines those two systems onto a single cable:

DATA COMMS: 5 - 98 MHz TDD (i.e. not amplified)

VOICE COMMS: 145 - 157 MHz & 170 - 185 MHz FDD

## System Components

As per regular leaky feeder system (course 2), plus:

LineAmp + Ethernet

Ethernet Coupler

QuadPort v2 (with VHF pass-through)

Basic passives from other vendors can be re-used:

Cable joiner

Terminator

Power dividers from other vendors need to be tested and qualified by RFI before using with DDLFS:

Power coupler

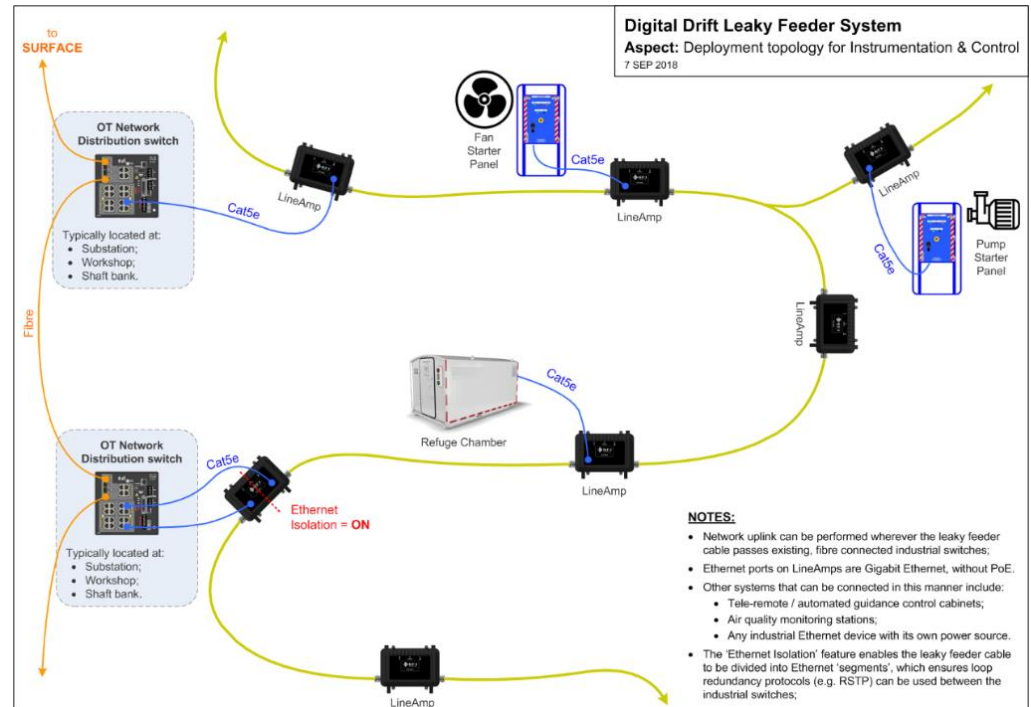
2-way branch / splitter

3-way branch / splitter

These devices need to pass 5 - 98 MHz satisfactorily

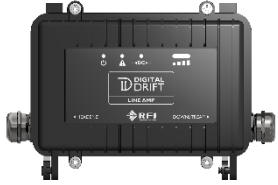
# Fundamentals - Reminder

- Amplify full duplex 2-way voice radio signals along leaky feeder cables
- Superior gain control strategy – suited to multi-carrier systems
- Passes the Digital Drift Signal (5-98 MHz) thus allowing Ethernet networking and power distribution combined onto VHF Leaky feeder;
- 2-way remote diagnostics capable with auto topology mapping (monitoring system yet to be released)
- Uses existing leaky coaxial cable in mines
- ~1Gbps half-duplex - shared between the nodes on each 'coax segment'
- Low latency - ~0.5ms added by each Digital Drift 'coax segment'



# Digital Drift Leaky Feeder - Active Devices

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## LINEAMP

Provides bi-directional amplification of the VHF radio channels, while passing the broadband data signal with minimal loss. The self-adjusting gain algorithm continually adapts to maintain consistent output levels, even as changes are made to the rest of the leaky feeder system.



## LINEAMP + ETHERNET

Provides all of the Line Amp features, plus a fully-featured Digital Drift Repeater. This enables:

- Data to be bridged onto and off the cable through the built-in RJ45 ports
- Digital re-generation of the broadband data signal, which ensures high data speeds over the network



## QuadPort 2

- **Leaky Feeder System:** an in-line device that can be spliced into the VHF leaky feeder system's cable to break out 4 x PoE++ ports. This takes the place of an Ethernet Coupler + QuadPort v1 when breaking out PoE ports from the Leaky Feeder System.
- **Data Only System:** replaces the Branch + QuadPort v1 from the existing "data-only" Digital Drift System.



## Gain Management Controller

- Automatic gain control
- Diagnostics interface - Future

# Digital Drift Leaky Feeder - Passive Devices

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## Power Coupler

The Power Coupler is used to inject DC power onto the leaky feeder cable.



## SPLITTER

Evenly divides both the VHF radio signal and the broadband data signal.



## ETHERNET COUPLER

Passes the VHF radio channels with minimal loss, while tapping a portion of the power and broadband data signal, enabling QuadPort V1's to be spliced into the line wherever they are needed.



## Cable Joiner

The Cable Joiner is used to connect two sections of cable - passing the DC power, VHF radio and broadband data signals through.



## DC Block

The DC Block isolates power between two sections of cable - while passing the VHF radio and broadband data signals through. Can be used as IS barrier.



## Termination Box

The Termination Box is used to prevent end of line reflections at the end of a cable run.

# Inter-operability

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- Existing "voice radio" sections of a leaky feeder system can be retained, without changing LineAmps, passives or power dividers
- The "voice radio + Ethernet" sections can be added in the middle, or at the extremities of an existing system
- In the "voice radio + Ethernet" sections:
  - All LineAmps must be replaced (in order to pass the 5 to 98 MHz signal)
  - All power dividers must be qualified to ensure they pass the 5 to 98 MHz signal
- Example - just "voice radio" in the travelways, and "voice radio + Ethernet" in the levels
- Example - "voice radio + Ethernet" in the travelways and "voice radio" in the levels

# Cabling

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- It is possible to operate on 50 Ohm LCX (e.g. CMC 50-12)
- Replace the glands with DDLFS-NF50-ADPTR
- Either:
  - Fit N-Male to the end of each 50 Ohm LCX and attach direct to each LineAmp
  - Fit N-Female to the end of each 50 Ohm LCX and use an N-Male to N-Male flexible jumper to connect the LineAmp

# Installation

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- As per the installation notes for the leaky feeder LineAmp (Course 2), BUT:
- Extra special attention needs to be applied to the cables on the Left and Right side of an LAE:
- Pictures (good):
  - straight cable runs in and out of LAE in opposing directions
  - as above, but with drip loops
- Pictures (bad):
  - cable running to an LAE and then back on itself (e.g. LAE in a cuddy)
  - cable coiled immediately on each side of the LAE
- The system **REQUIRES** > 90 dB isolation between Left and Right sides across 5 to 98 MHz. If this is breached, a network loop is formed and a broadcast storm takes down the entire network