Production & Measurement
of
Petroleum
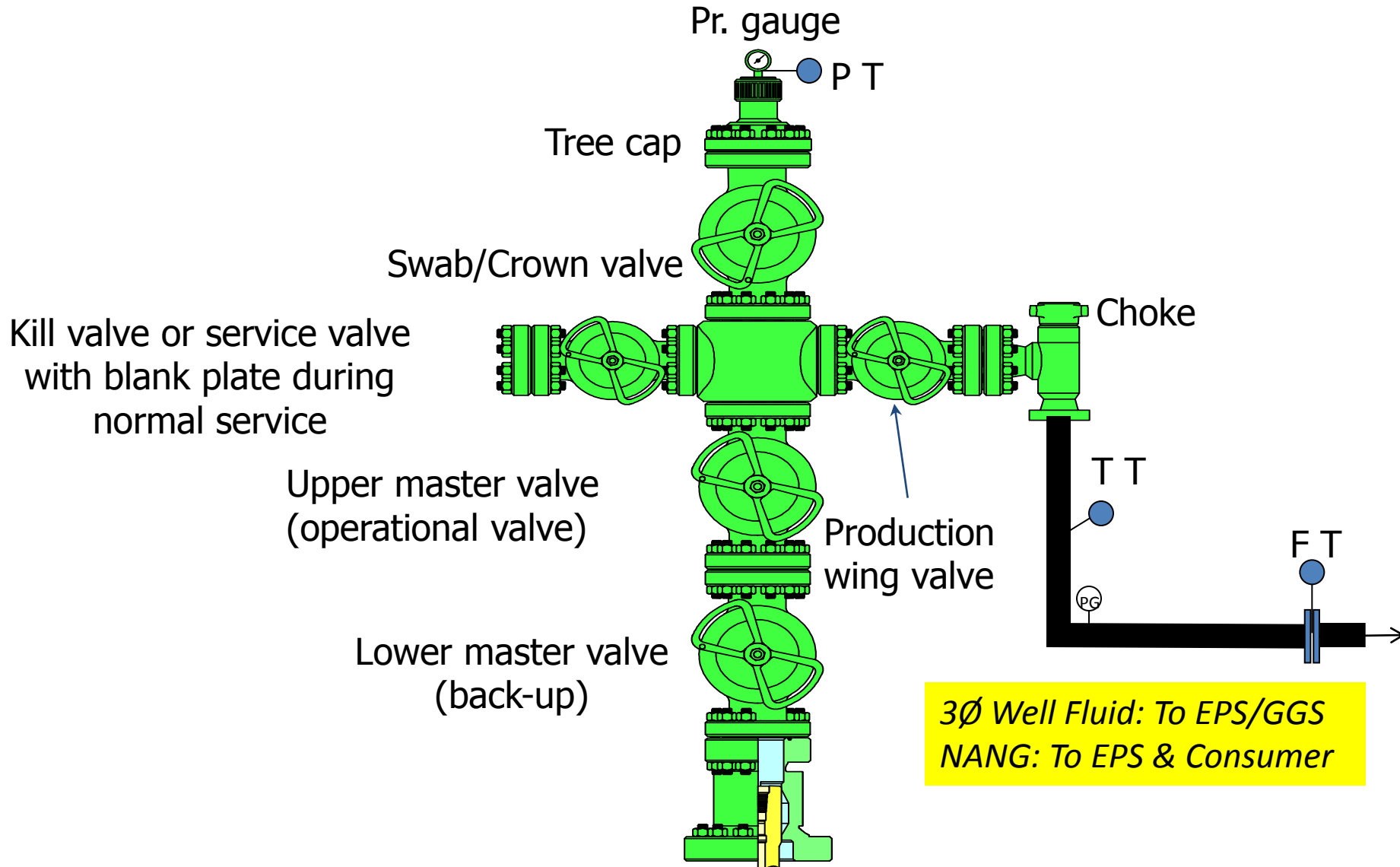
for

Small Oil and Gas Fields (Typical)

Contents

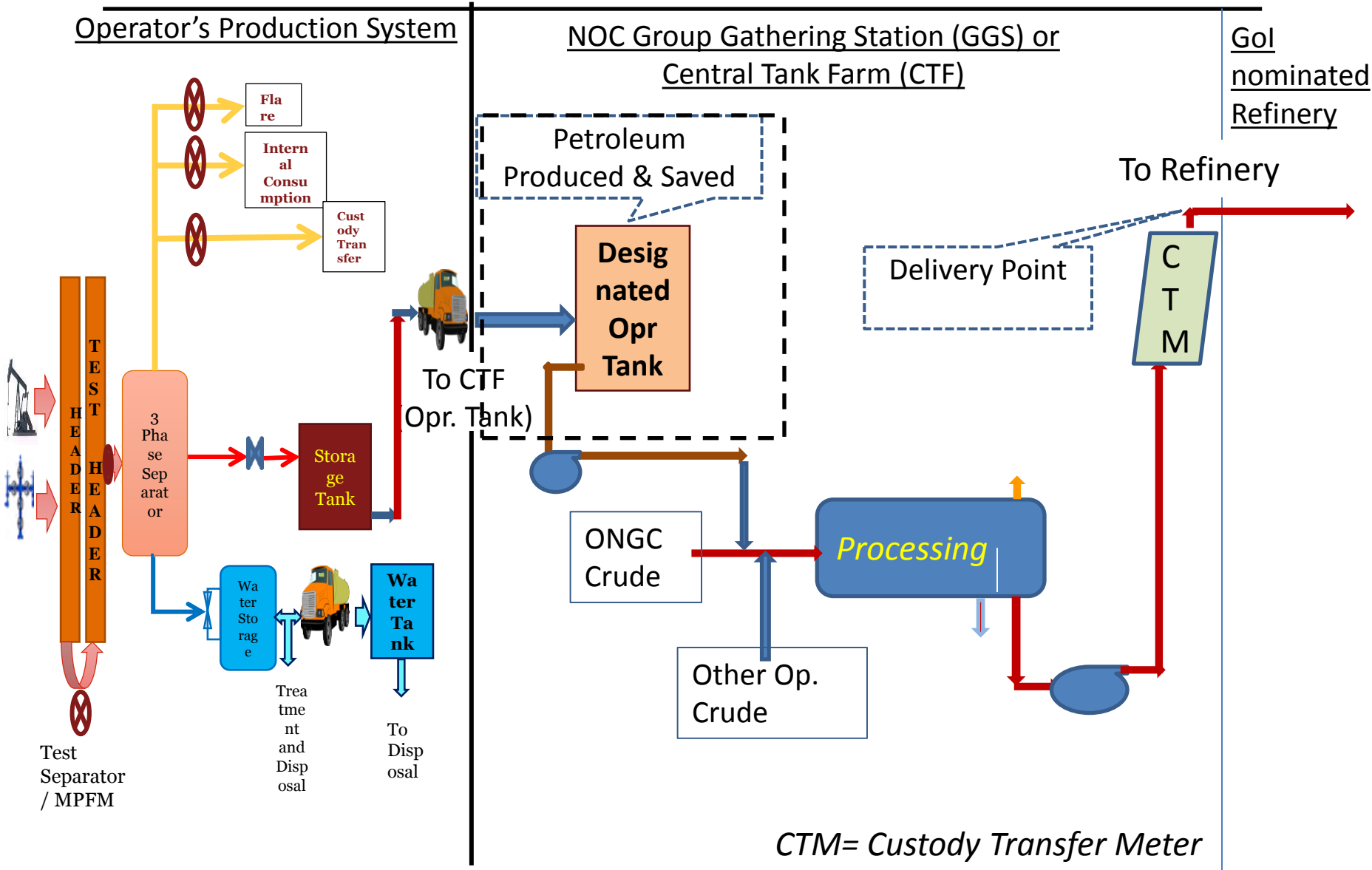| S/N	Topics
01	Well Level Production with PT, TT & FT (typical)
02	Group Gathering Station, Wells (typical)
03	Production Operations Boundaries
04	Real Time Petroleum Measurement Data Access system

Pr. gauge

P T

Tree cap

Swab/Crown valve

Kill valve or service valve with blank plate during normal service

Choke

Upper master valve (operational valve)

Production wing valve

T T

F T

Lower master valve (back-up)

3Ø Well Fluid: To EPS/GGS
NANG: To EPS & Consumer

Production Operations Boundaries – Crude Oil (Typical)

Operator's Production System

NOC Group Gathering Station (GGS) or Central Tank Farm (CTF)

GoI nominated Refinery

Flare

Internal Consumption

Custody Transfer

TEST HEADER

HEADER

3 Phase Separator

Storage Tank

Water Storage

Water Tank

Test Separator / MPFM

Treatment and Disposal

To Disposal

To CTF (Opr. Tank)

Petroleum Produced & Saved

Designated Opr Tank

ONGC Crude

Other Op. Crude

Processing

To Refinery

Delivery Point

C T M

CTM= Custody Transfer Meter

Production Operations Boundaries

Operator's Production System (Within Contract Area)

Well Fluid produced from Wells is processed for primary separation. Free water and associated gas is separated out from the emulsified crude to the maximum extent possible.

This emulsion crude is stored in the storage tank in the Contract Area . From time to time this emulsified crude is loaded in tankers for transportation to Operator's designated tank in NOC premise.

NOC GGS or CTF

As and when the designated tank is full or at least once in a month, the emulsified crude is first taken for processing and after that net processed crude is pumped to Refinery.

The whole operation from receipt of crude by NOC, to transfer of the same to the Refinery consists of two stages.

In the first step, quantity of Petroleum Produced and saved is determined at the outlet of operator's tank, and in the second step Net Quantity (N) receivable by the Refinery is calculated after considering Processing Loss, Effluent Loss & T/L transportation Loss.
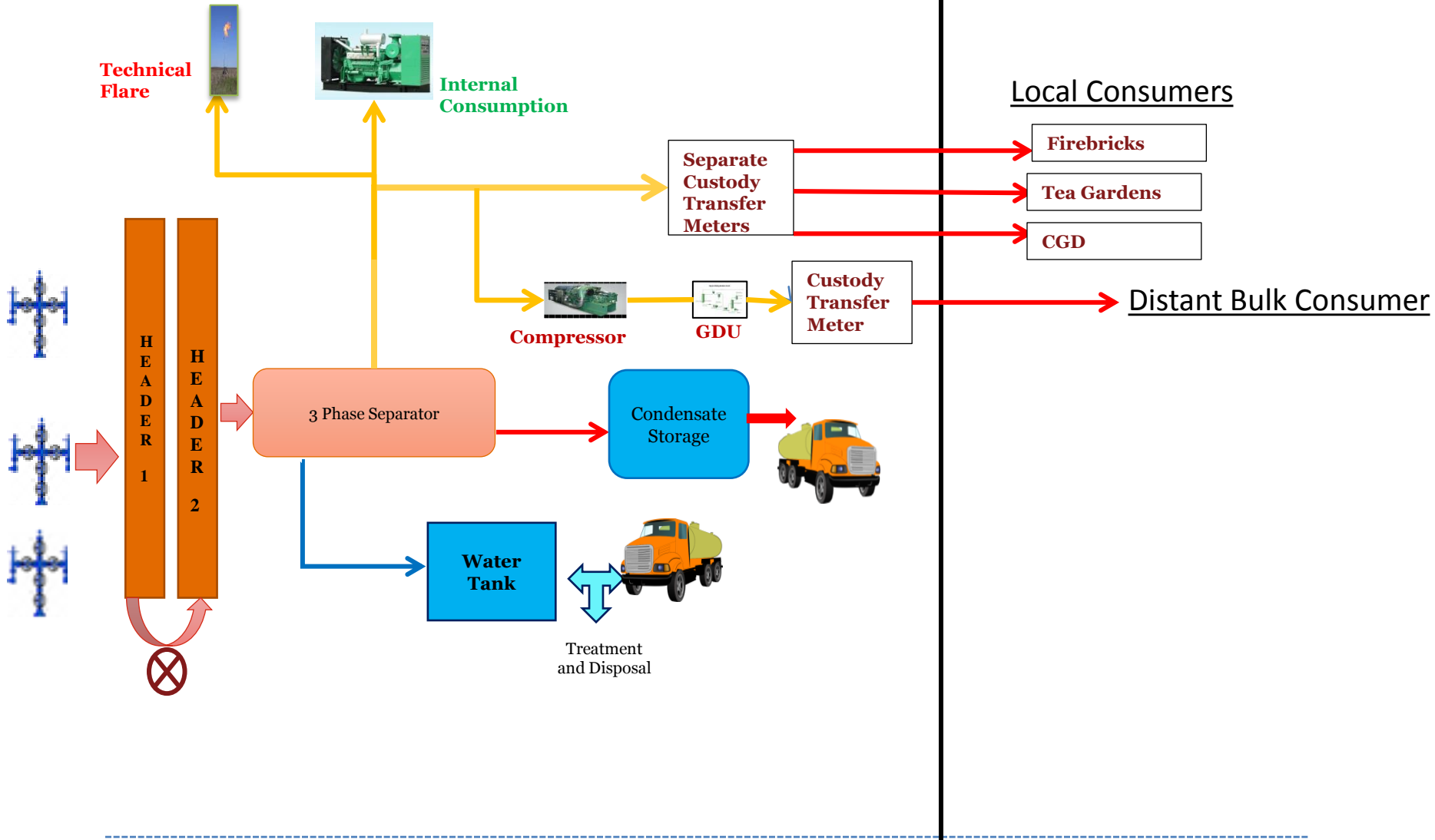
GoI nominated Refinery

N quantity of Crude is received by Refinery but the operator is reimbursed for N Quantity as well as for T/L Loss.

Production Operations Boundaries – Gas(Typical)

Operator's Production System (GCS)

Sales

Technical Flare

Internal Consumption

Local Consumers

Separate Custody Transfer Meters

Firebricks

Tea Gardens

CGD

Compressor

GDU

Custody Transfer Meter

Distant Bulk Consumer

H E A D E R 1

H E A D E R 2

3 Phase Separator

Condensate Storage

Water Tank

Treatment and Disposal

Production Operations Boundaries

Operator's Production System
(Within Contract Area)

Well Fluid (Non associated Gas) produced from Wells is processed for primary separation. Free water and condensate is separated out from the NANG to the maximum extent possible.

The gas is then compressed and dehydrated . Part of the gas is internally consumed for power generation and auxiliary facilities.

Some sales is also done to local consumers nearby.

Sales

Gas is consumed by nearby consumers like Firebricks, Tea Gardens, City Gas Distributors etc.

Bulk consumers at distances are like fertilizer plants, power plants etc. The require dehydrated gas at high pressures.

Some Authorities in Petroleum Operations

1. MoPNG & DGH

2. MoEF , Central & State PCB

3. Local Authorities for LAQ/ ROU and other operations

4. DGMS (Onshore)

5. OISD (Offshore)

6. Ministry of Labour & Labour Commissioner
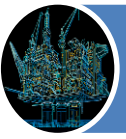
7. MOD, Coast Guard (Offshore)

for DSF

Overview
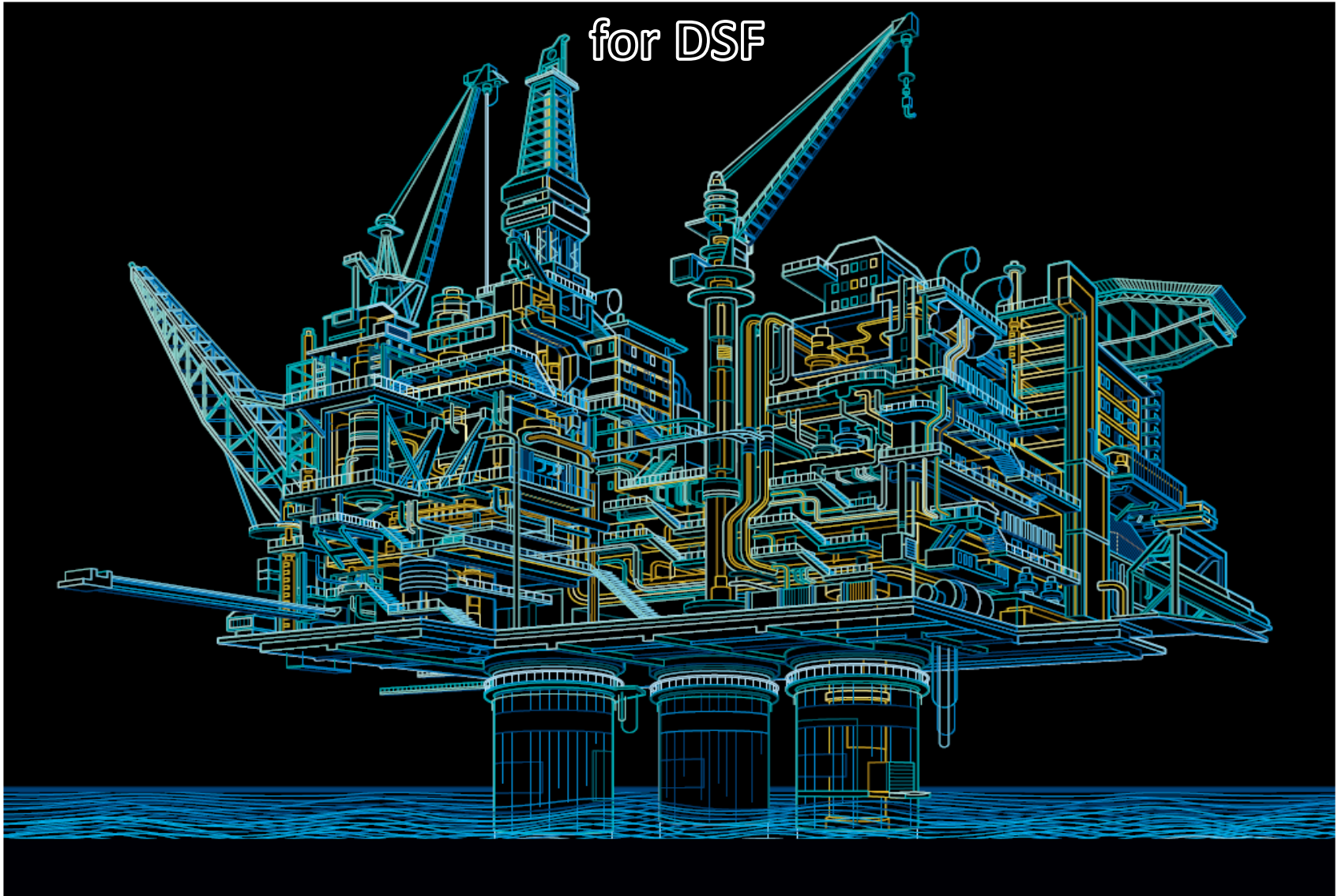
➢ *Government of India offered 46 Contract Areas with 67 oil and gas Discovered small fields for production with an estimated 625 Million Barrels of Oil and Oil Equivalent Gas (O+OEG) in-place, spread over 1,500 square kilometers in On land, Shallow water and Deepwater areas.*

➢ *Discovered Small Field policy is based on Revenue Sharing Contract (RSC) model.*

➢ *Under Article-13 & 13.7 of MRSC provides sufficient flexibility to DGH/ Government to issue directions to the Contractor on the methodology of measurement, the equipment used for the measurement and the points of measurement of petroleum*

➢ *In view of the nature of Revenue Sharing Contract, a " Real time petroleum measurement monitoring and data access" system is to be put in place.*

Objectives of Real Time Measurement

- ➢ Generation of petroleum measurement data from DSF.

- ➢ Data capture at various measurement points in the fields on real time basis.

- ➢ Transmission of captured data in real time to Data storage facility/Linking with NDR

- ➢ Visualization & Archival of data at DGH for regulatory oversight.

Help to enhance transparency in field petroleum measurement activities.

Minimize loss due to theft, fraud and meter tampering.

Facilitate instant audit on Petroleum inventories of the field.

Quick & Effective consolidation of information about field performances.

Minimum manual interference in measurement data reporting.

Possible integration of the system to any ERP software for automated accounting.

Regulatory oversight and inspections with the help of automated exception reports.

Real time monitoring Typical installation examples

GSPC- Various sales point across Gujarat

Sabarmati Gas: Sales points across Gandhi Nagar, Gujarat

Maharashtra PCB: Real Time Online Monitoring Of Effluent & Emission Monitoring System

ONGC: Remote well head monitoring of their wells in Gujarat , Assam. Real time Tubing, Casing and Flow line pressures, temperatures and flow rates through SCADA

CBM:CBM field Operator M/S GEECL GSM based communication system for Real time capture of Sales Gas measurements .

GAIL-Lakhwa field, Assam , Gas sales

SCADA: Implemented Globally across industries for Real time process control and monitoring

Tier -1

GENEARTION OF MEASUREMENT DATA (online feed)

| Well head Pr. Temp & flow | Storage Tank | Dispatch to marine tanker | Dispatch through bowser |

Pressure & Temperature Transmitter

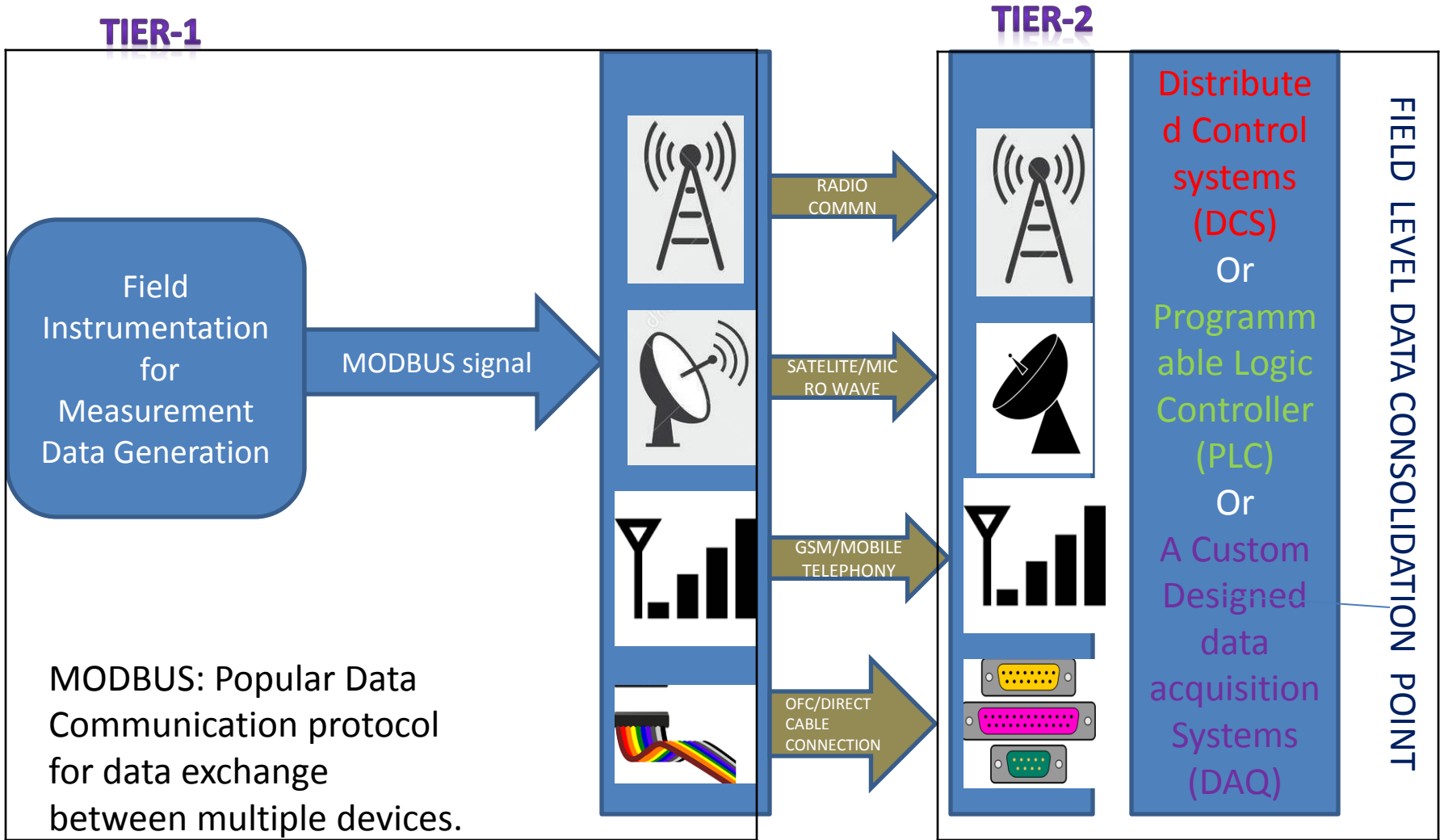DPT-Orifice (Flow)

Radar Type (Tank level sensor)

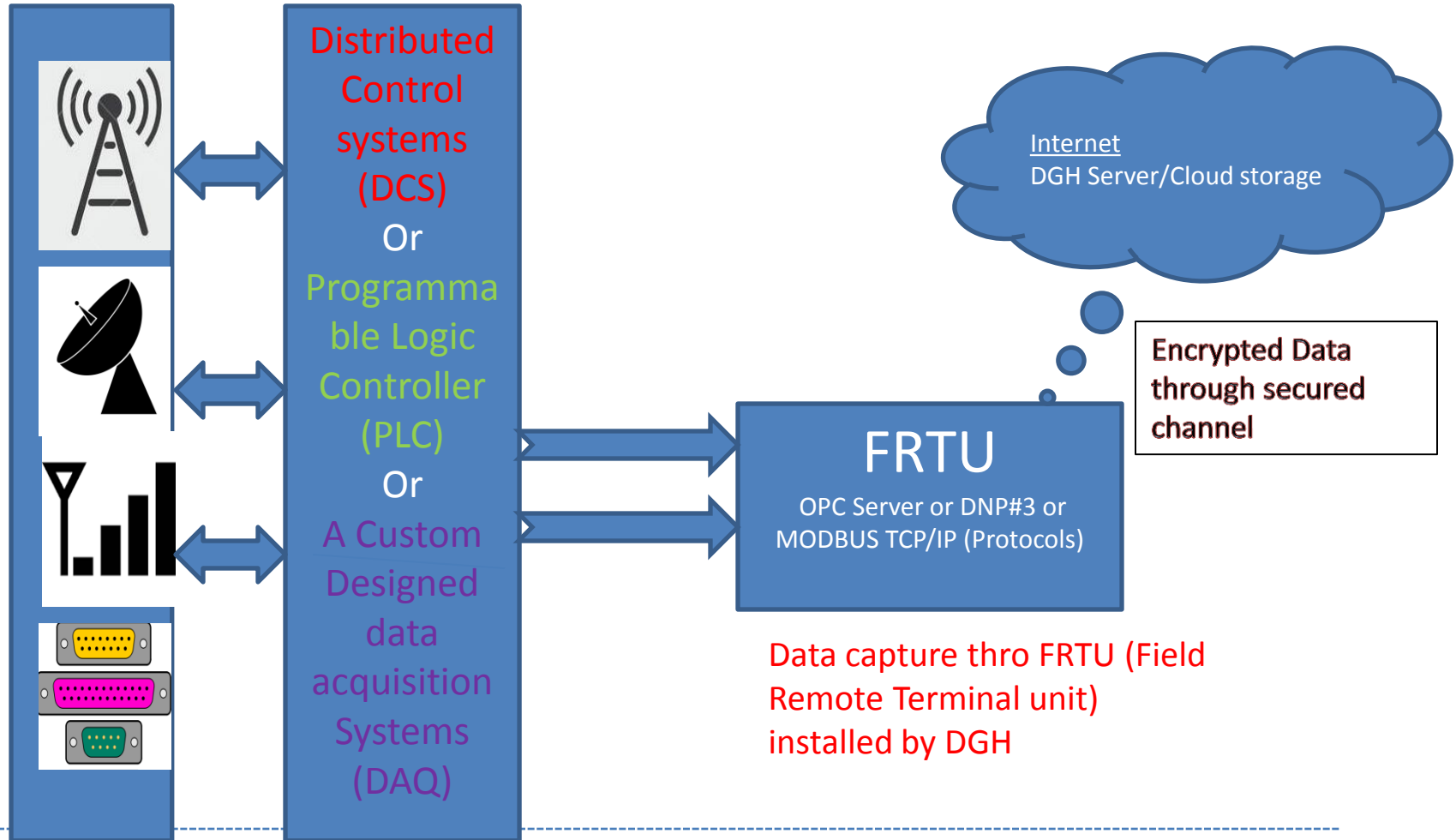Vortex flow meter(Flare Gas)

Ultra Sonic flow meter(Custody transfer)

Coriolis flow meter- (Tanker loading)

Field Level Data Capture

TIER-1

Field Instrumentation for Measurement Data Generation

MODBUS signal

RADIO COMMN

SATELITE/MICRO WAVE

GSM/MOBILE TELEPHONY

OFC/DIRECT CABLE CONNECTION

TIER-2

Distributed Control systems (DCS) Or Programmable Logic Controller (PLC) Or A Custom Designed data acquisition Systems (DAQ)

FIELD LEVEL DATA CONSOLIDATION POINT

MODBUS: Popular Data Communication protocol for data exchange between multiple devices.

Field data reception and Remote Transfer Scheme for Onshore & Off shore

TIER-2

Distributed Control systems (DCS)
Or
Programmable Logic Controller (PLC)
Or
A Custom Designed data acquisition Systems (DAQ)

FRTU
OPC Server or DNP#3 or MODBUS TCP/IP (Protocols)

Internet
DGH Server/Cloud storage

Encrypted Data through secured channel

Data capture thro FRTU (Field Remote Terminal unit) installed by DGH

Direct Transmission Schematic
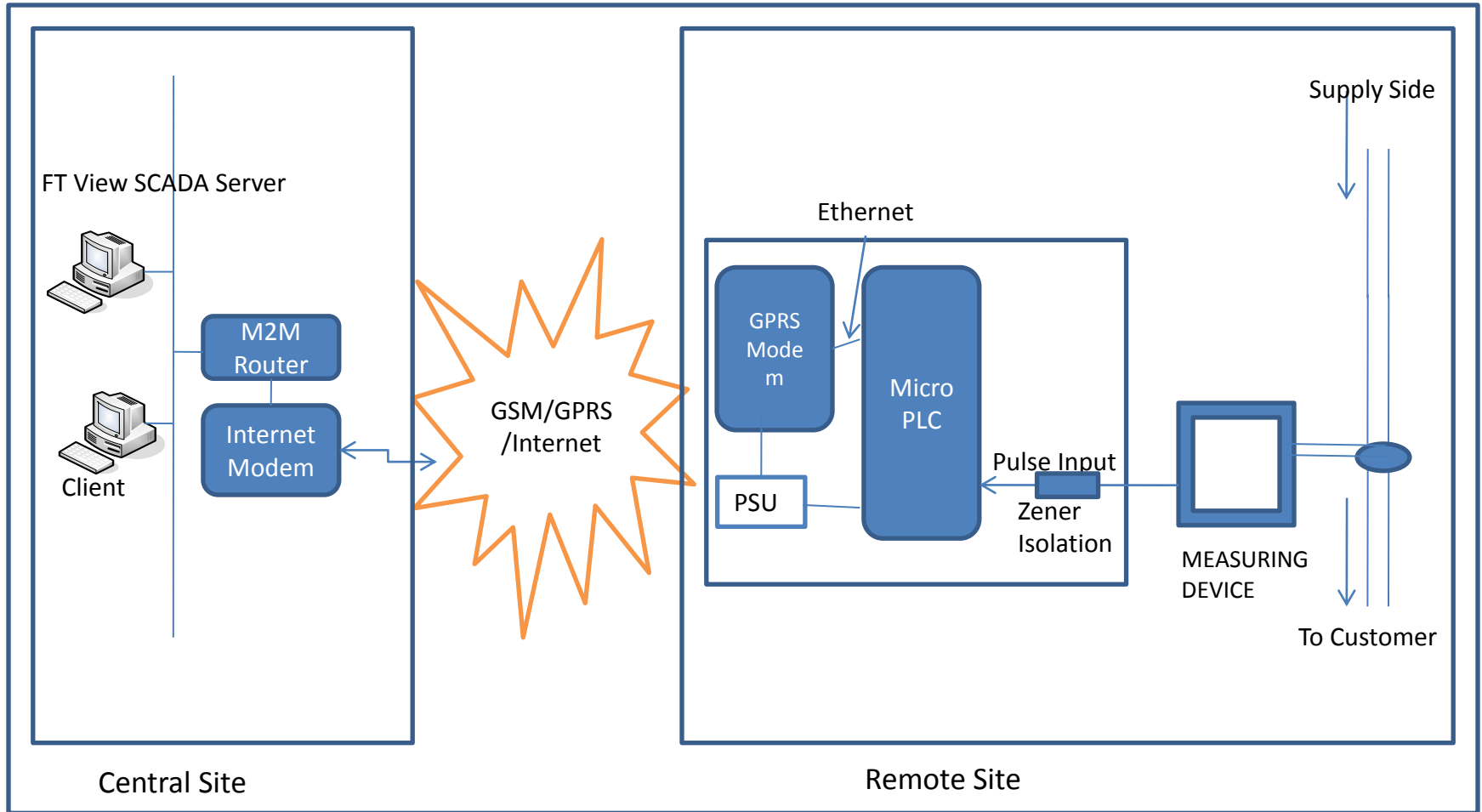
DGH- Data Access and Archival Tier.3

Field Production Summary

Well Test Results

Petroleum sales and stock

DGH User Interface

Internet
DGH Server/Cloud storage

Non-Standard Submittal DB
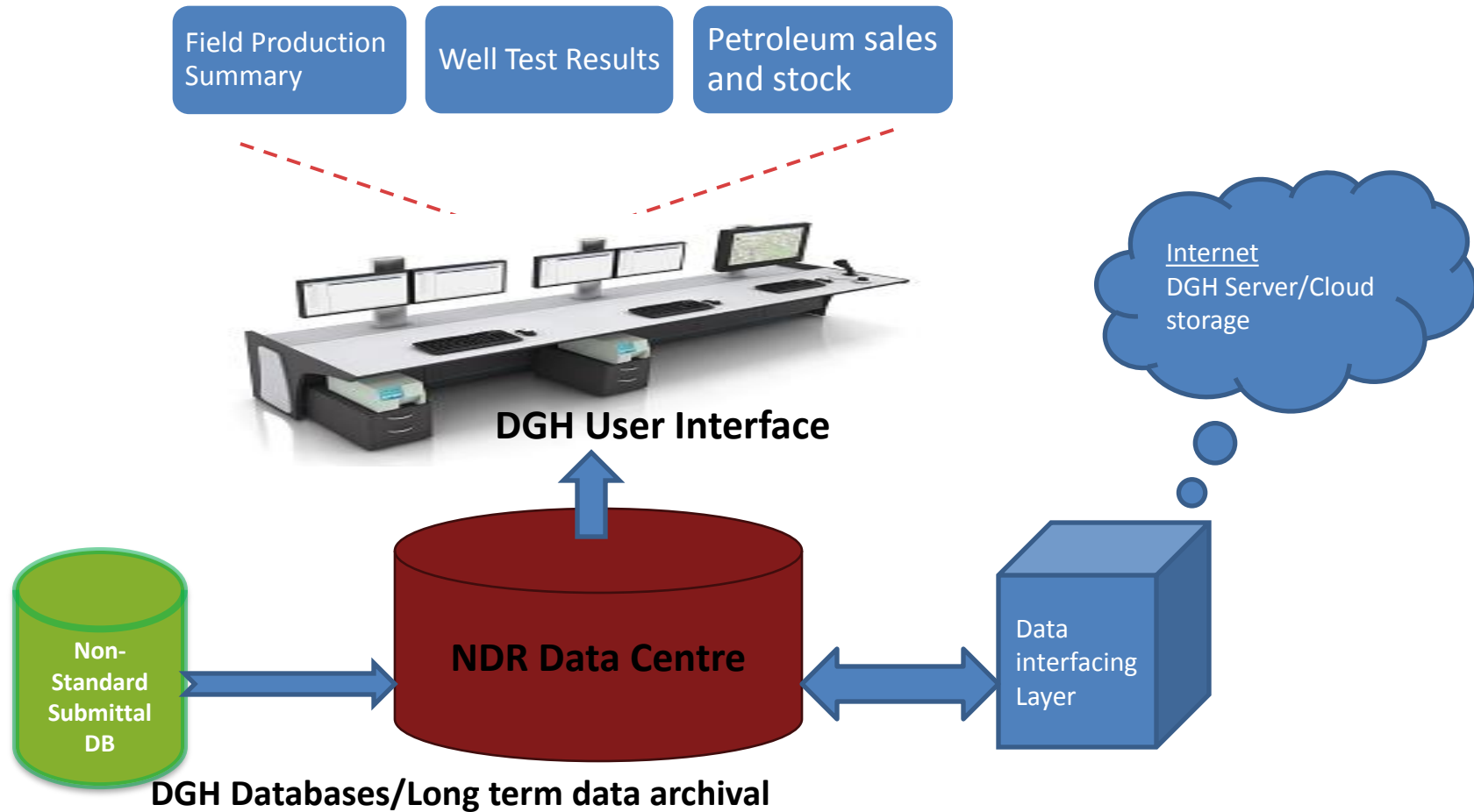
NDR Data Centre

Data interfacing Layer

DGH Databases/Long term data archival

Measurement Guidelines for DSF from DGH.

Identification and declaration of suitable processing facilities by DSF Operators in FDP.

Operators are to incorporate the recommendations as per DGH Guidelines while at design stages .

Technical Evaluation & Review of the proposed design by DGH.

Formal approval and monitoring of field implementation activities.

Implementation Strategy (contd.)

Operator to declare the details of Pressure transmitter, temperature transmitter, Orifice Flow transmitter (per Well) and the custody meter(s) in FDP.

Operator should facilitate data transfer from all field locations and points to a single Place called CDRS Central data receiving stations(Commonly GGS or its Central control room),

Operator may suitably identify and deploy available communication methodology for bringing field data up to CDRS.

DGH- Would Tap the DATA thus received from various field instruments through custom designed Hardware-Software combinations

Operator should Design, adopt and install suitable Hardware and Terminal units for facilitating smooth Data transfer to DGH FRTU Unit.

Transfer of the data thus captured after encryption through fully secured High speed Broad Band, GSM or Satellite network to a Cloud storage/internet

Thank You