IntelliServ™
Product Catalog

NOV Wellbore Technologies

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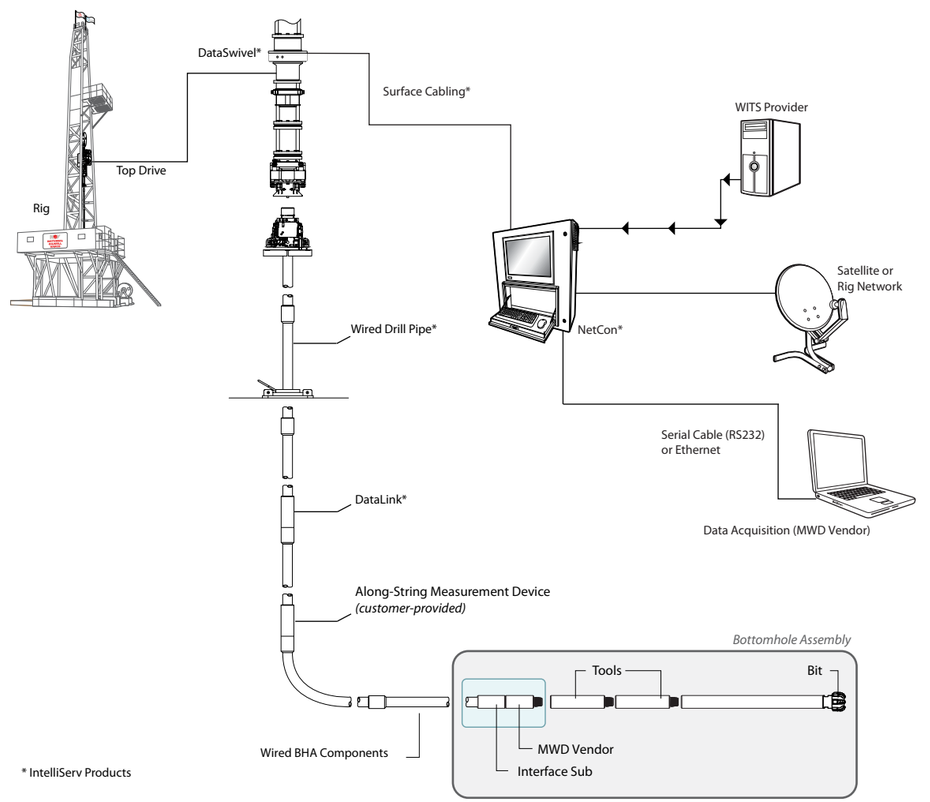


IntelliServ™ Network — General Overview

The IntelliServ Wired Drill Pipe Network enables instantaneous and bi-directional transmission of downhole data while drilling. Rig time is saved as surveys, downlinks, slide orientations and other data-driven activities are performed in a manner of seconds versus minutes with conventional telemetry. Performance limiters associated with LWD data density, directional control, well placement and hole cleaning management can be addressed with high frequency and low latency data, enabling higher rates of penetration (ROP) to be achieved.

By transmitting the same data required to drill a well, simply faster, well times can be reduced by multiple days.

To estimate how much time Wired Drill Pipe can save off your wells, visit nov.com/drillfaster.

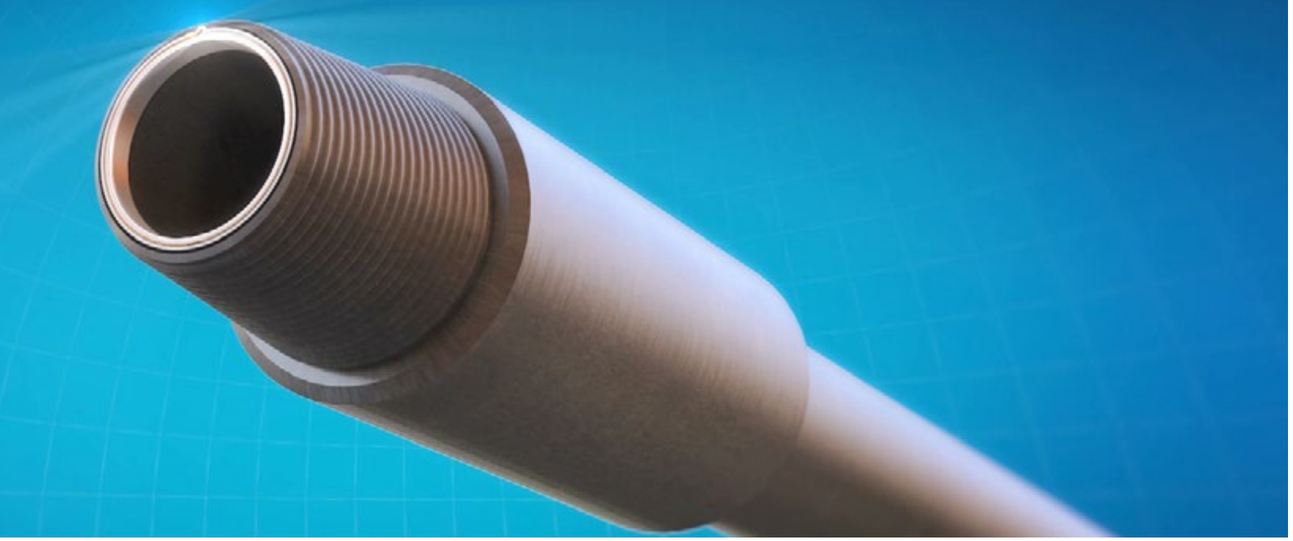
There are five main components used to run the IntelliServ Network:

Wired Drill String components (Drill Pipe, Heavy-Weights and Drill Collars) — Conventional drill pipe modified to accommodate an inductive coil embedded in the secondary shoulder of both the pin and box. These coils are connected via an armored, high-strength DataCable embedded inside the tool joint and enables high-speed downhole data to be transmitted across the drill string.

DataLinks™ — Clean and boost the data signal for optimal signal-to-noise ratio along the network. DataLinks are typically placed every 1,500 feet along the drill string.

NetCon™ and Surface Cabling — Securely transfers data and tool commands to and from local and remote users in real-time.

DataSwivel™ — Extracts and relays data from rotating drill pipe to the NetCon to be used by service partners and operators.



The IntelliServ™ Network is based on premium quality Grant Prideco tubulars with proprietary Grant Prideco Double Shoulder™ connections (wXT™, wTT™ or wGPDS™, depending on size). Each tubular is modified to include a high-speed, high-strength DataCable™ along the internal diameter and patented IntelliCoil™ in the connection secondary shoulders.

Wired Drill Pipe

Product Series Number	Pipe Body Size (in)	Connection	Pipe Body Wall Thickness (in)	Nominal Weight (lb/ft)	Tool Joint ID (in)	Tool Joint OD (in)	Recommended MUT* (ft-lbs)	Min MUT* (ft-lbs)
wXT38-DP	4”	wXT38	0.330 0.380	14.0 15.7	2.438	4.875	18,100	15,000
wTT390-DP	4”	wTT390	0.330 0.380	14.0 15.7	2.438	5.000	25,600	21,300
wGPDS50-DP	5”	wGPDS50	0.362	19.5	3.250	6.625	38,900	32,400
wXT54-DP	5-1/2”	wXT54	0.361	21.9	4.000	6.750	45,900	38,300
wTT550-DP	5-1/2”	wTT550	0.361	21.9	4.000	6.750	51,100	42,500
wXT57-DP	5-7/8”	wXT57	0.361 0.415	23.4 24.2	4.250	7.000	49,900	41,500
wGPDS65-DP	6-5/8”	wGPDS65	0.362 0.522 0.625	27.7 34.0 40.0	4.500	8.250	76,200	63,500

**Make-up torque (MUT) values are based on the standard configuration and 130psi yield tool joint material of each connection. Customer specific requirements and the configuration of actual components may modify the MUT specification.*

Features and Options

Internal Plastic Coating: Tuboscope TK™-34, TK™-34P
Full range of hardbandings available including Tuboscope TCS™ Hardbanding
Extended tool joints
Range 2 or Range 3
Full range of steel grades including sour service available
Other options available upon request

BHA Components

Similar to Wired Drill Pipe, the IntelliServ™ Network uses premium quality Grant Prideco Heavy Weight Drill Pipe with wGPDS™, wTT™ and wXT™ connections as well as premium quality Grant Prideco Drill Collars with wDC™, wGPDS™, and wXT™ connections. These BHA components have been modified to include a high-speed, high-strength DataCable™ along the internal diameter and patented induction coils in the connection secondary shoulders. A full range of crossovers and saver subs are available upon request.

Wired Heavy Weight Drill Pipe**

Product Series Number	Pipe Body Size (in)	Connection	Adjusted Weight (lb/ft)	Tool Joint ID (in)	Tool Joint OD (in)	Recommended MUT* (ft-lbs)	Min MUT* (ft-lbs)
wXT38-HW	4”	wXT38	30.3	2.438	4.875	18,100	15,000
wTT390-HW	4”	wTT390	30.8	2.438	5.000	25,600	21,300
wGPDS50-HW	5”	wGPDS50	51.1	3.000	6.625	43,000	35,800
wXT54-HW	5-1/2”	wXT54	57.6	3.250	6.750	48,600	40,500
wTT550-HW	5-1/2”	wTT550	57.4	3.250	6.750	53,900	44,900
wXT57-HW	5-7/8”	wXT57	55.5	4.000	7.000	52,800	44,000
wGPDS65-HW	6-5/8”	wGPDS65		4.500	8.250	76,200	63,500

**Make-up torque (MUT) values are based on the standard configuration and 130psi yield tool joint material of each connection. Customer specific requirements and the configuration of actual components may modify the MUT specification.*

***All are Range 2.*

Wired Drill Collars

Product Series Number	Size (in)	Connection	Adjusted Weight (lb/ft)	Standard Tool Joint Material Strength (psi)	Body ID (in)	Body OD (in)	Max Mut* (ft-lbs)	Recommended MUT* (ft-lbs)
wXT38-DC	4-7/8”	wXT38 SRG	47.7	120,000	2.438	4.875	14,300	13,000
wGPDS50-DC	6-1/2” 6-3/4”	wGPDS50 SRG	89.0 101.7	120,000	3.000 2.750	6.500 6.750	34,700 38,000	31,500 34,600
wDC58-DC	8”	wDC58	149.2	100,000	2.875	8.000	63,700	57,900
wDC69-DC	9-1/2”	wDC69	211.08	100,000	3.375	9.500	107,800	98,000

**Make-up torque (MUT) values are based on the standard configuration of each connection. Customer specific requirements and the configuration of actual components may modify the MUT specification.*

Features and Options

Hardbanding
Internal coating
Slip/elevator groove
Spiral, slick and tri-spiral wear sections available

Stabilizers

Product Series Number	Stabilizer Body Size (in)	Connection	Body OD (in)	Blade Size Range (in)
wXT38-STAB	4-7/8”	wXT38	4.875	5-7/8” - 6-3/4”
wGPDS50-STAB	6-1/2”	wGPDS50	6.500	8-3/8” - 9-1/2”
wDC58-STAB	8”	wDC58	8.000	10-5/8” - 26”
wDC69-STAB	9-1/2”	wDC69	9.500	12-1/4” - 26”

Ancillary Components**

IntelliServ™ can supply a range of common drill string ancillary components wired for use on the IntelliServ Network.

Ancillary Components

Component	Size (in)	Connection
Float Subs	4-7/8”	wXT38
Float Subs	6-1/2”	wGPDS50
Float Subs	6-5/8”	wGPDS50
Float Subs	8”	wDC58
Dart Subs	7”	wXT57
Dart Subs	4-7/8”	wXT38
Safety Valves	5-1/4	wXT38
Safety Valves	7”	wGPDS50
Safety Valves	7-3/8”	wXT57
Pump in Subs	6-5/8”	wGPDS50

***Steel or non-magnetic options.*

***OD and ID are determined based upon connection type.*

DataLinks

The IntelliServ™ Network is created when DataLinks™ are installed into the wired drill string. DataLinks contain signal amplification electronics and a self-contained power source to enable the data signal to be amplified and transmitted reliably along the drill string. DataLinks are designed as a six foot long sub with matching drill pipe connections on both ends. These can be added to Range 2 or Range 3 length drill pipe or HWDP to form stands 6 feet longer. Alternatively, IntelliServ can also supply DataLink joints in both drill pipe and HWDP configurations, which can be mated to the DataLink to create a conventional Range 2 or Range 3 length assembly. DataLinks are typically placed every 1,400 – 1,500 feet along the drill string. IntelliServ recommends additional units for service contingency. Consult IntelliServ for DataLink spacing guidance.

DataLinks

DataLink (in)	Connection	Box TJ OD (in)	Pin TJ OD (in)	Min ID (in)	Length Range (ft/m)	Temperature Range (°C)	Average Battery Life* (hrs)
4”	wXT38	4.875	4.975	1.750	6.0 / 1.9	-40 to 150	850
4”	wTT390	5.000	4.975	1.750	6.0 / 1.9	-40 to 150	850
5”	wGPDS50	6.625	6.625	3.250	6.0 / 1.9	-40 to 150	1250
5-1/2”	wTT550	6.750	7.000	3.500	6.0 / 1.9	-40 to 150	1250
5-1/2”	wXT54	6.750	6.750	3.250	6.0 / 1.9	-40 to 150	1250
5-7/8”	wXT57	7.000	7.000	3.500	6.0 / 1.9	-40 to 150	1250
6-5/8”	wGPDS65	8.500	8.500	4.125	6.0 / 1.9	-40 to 150	1250

** Dependent upon operating conditions, battery life refers to active Network hours. DataLink enters lower power sleep mode when not active.*

Drill Pipe DataLink Joints**

DataLink (in)	Connection	Length (ft/m)
4” (Range 2)	wXT38 or wTT390	25.5 / 7.8
4” (Range 3)	wXT38 or wTT390	38.5 / 11.7
5” (Range 2)	wGPDS50	25.5 / 7.8
5” (Range 3)	wGPDS50	38.5 / 11.7
5-1/2” (Range 2)	wTT550	25.5 / 7.8
5-1/2” (Range 3)	wTT550	38.5 / 11.7
5-1/2” (Range 2)	wXT54	25.5 / 7.8
5-1/2” (Range 3)	wXT54	38.5 / 11.7
5-7/8” (Range 2)	wXT57	25.5 / 7.8
5-7/8” (Range 3)	wXT57	38.5 / 11.7
6-5/8” (Range 2)	wGPDS65	25.5 / 7.8
6-5/8” (Range 3)	wGPDS65	38.5 / 11.7

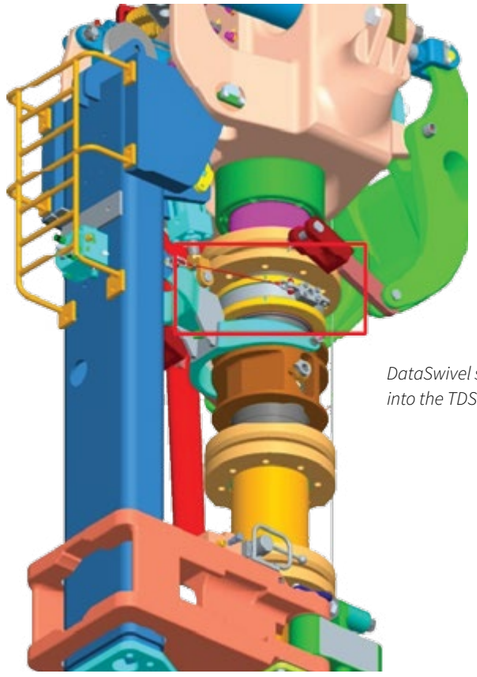
HWDP DataLink Joints**

DataLink (in)	Connection	Length (ft/m)
4”	wXT38 or wTT390	25.5 / 7.8
5”	wGPDS50	25.5 / 7.8
5-1/2”	wTT550	25.5 / 7.8
5-1/2”	wXT54	25.5 / 7.8
5-7/8”	wXT57	25.5 / 7.8
6-5/8”	wGPDS65	25.5 / 7.8

*** Matching specifications and configurations available as referenced on page 4 (drill pipe) and page 5 (heavy weight drill pipe).*

DataLink Assembly Design

DataSwivels and Installation Kits*



DataSwivel shown in yellow, integrated into the TDS-8 Top Drive Assembly

A key component of the IntelliServ Network™ is the DataSwivel™ which provides the interface between rotating and stationary environments. The DataSwivel is installed either above the upper IBOP or between the lower IBOP and above the saver sub depending on the top drive design. Wired IBOPs are available where required. This allows for transfer of data from the rotational string to a stationary component. Surface data cabling is configured to meet the individual rig requirements.

IntelliServ has developed DataSwivels for the following Top Drive models.

Manufacturer	Top Drive Model
NOV	TDS - 11
NOV	TDS - 4
NOV	HPS - SG
NOV	HPS - KT
NOV	TDS - 7
NOV	TDS - 3
NOV	TDS - 8
NOV	PS2 - 650 / 750
Maritime Hydraulics	DDM-1000
TESCO	Various
Canrig	Various

**Additional models can be engineered upon request.*

Surface System

The IntelliServ™ Surface System is a group of products that consists of an IntelliServ network controller (NetCon™), test fixtures of various sizes, and NetPulse™ a functional integrated pipe tester. NetCon securely transfers data and tool commands to and from local and remote users in real-time. Multiple discrete users can be connected (via serial or Ethernet protocol), allowing independent, simultaneous use of the network by different tool vendors. NetCon also includes the ability to test the network periodically to ensure a constant flow of downhole data.

NetCon

Description	Height (in)	Width (in)	Depth (in)	Weight (lbs)	Certifications	Power Requirement	Data Connections
NetCon - land, included internal UPS	36	30	12	199	Outputs: ATEX/IECEx Class I, Zone 0 Group IIB and FM US/CA Class I, Div. 1, Groups C, D. Overall: CE	100-240 V AC	RS-232 WITS - Ethernet, Swivel - Twinaxial, Testing - Twinaxial
NetCon - offshore, no internal UPS	36	30	12	185	Outputs: ATEX/IECEx Class I, Zone 0 Group IIB and FM US/CA Class I, Div. 1, Groups C, D. Overall: CE	100-240 V AC	RS-232 WITS - Ethernet, Swivel - Twinaxial, Testing - Twinaxial
Adjustable Stand for NetCon	24 - 36	36	20	180	N/A	N/A	N/A
External Touchscreen Monitor Kit	19 - 24	24	11	50	CE, Protection Class IP 65	N/A	N/A
Shipping Case for NetCon	19	53	43	125	Certifications: Mil. Spec., air and water tight, dust proof, corrosion resistant	N/A	N/A

Surface Cabling*

Description	# of Cables Included	# of Junction Boxes
Custom Surface Cabling Kit	20	8

**Other specialized Surface Cabling Kits and additional individual or special cables are available upon request.*

NetCon

Aftermarket

NetPulse

Description	Height (in)	Width (in)	Length (in)	Weight (lbs)	Certifications*	Power	Battery Life (hrs)
NetPulse - Complete system with cart and elec. toolbox AC and battery powered	59.8	32.0	59.8	~200	CE	100 - 240 V AC	3.5
NetPulse - Electronics toolbox AC and battery powered	27.0	19.3	20.3	~25	CE	100 - 240 V AC	3.5

**Certifications for these products are pending approval.*

Test Fixtures

Slimline Testing Fixtures available in connection types DS50, XT57, DC58, XT38, DS65, NC61, DC69, TT390 and TT550.

Repair & Maintenance

IntelliServ provides regional support to all repair and maintenance partners with all consumables to re-dress wired components. These components include coils, cables, and all auxiliary components to properly test, disassemble, and assemble the final wired product. IntelliServ provides full service and battery changes to DataLinks in the field. IntelliServ works with customers to make sure the DataLinks are available on the rig in a timely manner and are well maintenanced for the rigorous drilling activities.

NetPulse

Drill String Accessories from Partners

IntelliServ™ works closely with leading downhole and surface tool providers to make available a wide array of other wired drill string components, including drilling jars, underrearmers, accelerators, and roller reamers.

The following table lists the range of drilling tools that have been developed to operate on the IntelliServ Network using a wired variant.

BHA Components

Component	Manufacturer	Size	Connection	Additional Description
Jar	Weatherford®	6-1/2”	XT57	Hydro-Mechanical
Jar	Weatherford®	8”	DC58	Hydro-Mechanical
Jar	Weatherford®	8”	XT57	Hydro-Mechanical
Jar	NOV	4-3/4”	XT38	Hydro-Mechanical
Jar	NOV	6-1/2”	GPDS50	Hydro-Mechanical
Jar	NOV	6-1/2”	wXT54	Hydro-Mechanical
Jar	NOV	8”	GPDS65	Hydro-Mechanical
Jar	NOV	8”	XT57	Hydro-Mechanical
Jar	NOV	8”	DC58	Hydro-Mechanical
Jar	NOV	9-1/2”	DC69	Hydro-Mechanical
Jar	NOV ShockForce Jar	6-1/2”	GPDS50	Hydraulic
Jar	NOV ShockForce Jar	6-1/2”	TT550	Hydraulic
Jar	NOV ShockForce Jar	8”	DC58	Hydraulic
Jar	Schlumberger® Smith	6-1/2”	GPDS50	Hydraulic
Jar	Schlumberger® Smith	6-1/2”	GPDS50	Hydraulic
Accelerator	Weatherford®	6-1/2”	GPDS50	Hydro-Mechanical
Accelerator	Weatherford®	8”	XT57	Hydro-Mechanical
Accelerator	NOV Intensifier	8”	XT57/DC58	Hydraulic
Accelerator	NOV Intensifier	6-1/2”	GPDS50	Hydraulic
Accelerator	NOV Intensifier	6-1/2”	TT550	Hydraulic
Accelerator	NOV Intensifier	9-1/2”	DC69	Hydraulic
PBL	PBL Flow Bypass Sub	6-3/4”	GPDS50	Circulating Sub
PBL	PBL Flow Bypass Sub	8-1/4”	DC58	Circulating Sub
Roller Reamer	Redback	8-1/4”	GPDS50	Fixed Gauge
Roller Reamer	Redback	12-1/4”	DC58	Fixed Gauge
Roller Reamer	Redback	8-1/2”	GPDS50	Fixed Gauge
Underreamer	Schlumberger® Smith (10000)	10”	DC58	11 - 12 1/2” Opening Size
Underreamer	Schlumberger® Smith (11625)	11-5/8”	DC58	13 - 15” Opening Size
Underreamer	Schlumberger® Smith (14250)	14-1/4”	DC58	15 3/4 - 18 1/4” Opening Size
Underreamer	NOV Andergauge	8-1/2”	GPDS50	9 - 9 7/8” Opening Size
Underreamer	NOV Andergauge	12-1/4”	DC58	12 3/4 - 14 3/4” Opening Size
Drift Catcher	Churchill	7”	XT57	Drift OD 3.25”
Drift Catcher	Churchill	6-5/8”	GPDS50	Drift OD 2.42”
Drift Catcher	Churchill	4-7/8”	XT38	Drift OD 2.25”
Shock Tool	NOV	6-3/4”	GPDS50	Mechanical
Agitator	NOV	6-3/4”	GPDS50	Agitator

Service & Equipment Delivery

After drilling more than 130 wells with Wired Drill Pipe, the IntelliServ™ Network is now available through conventional driling service and equipment suppliers.

Wired Drill String

Wired Drill Pipe and other drill string components are now available for purchase in the same manner as conventional drill pipe. Wired Drill Pipe can be purchased by Rig Contractors, DP rental providers, and Operators. A comprehensive range of other drill string components are also available for purchase including Wired HWDP, Drill Collars, Float Subs, Stabilizers, and Crossover plus the Top Drive DataSwivel™.

Wired Drill Pipe Rental Providers: TOOLSERV, Independent Oil Tools, Workstrings International

High Speed WDP Telemetry

MWD or Measurement Companies can offer High Speed Telemetry on an IntelliServ Wired Drill String using their own Interface Subs plus DataLinks™ and a Surface Network Controller (“NetCon™”) leased from IntelliServ. IntelliServ has established training courses on the operation of WDP High Speed Telemetry and will maintain a 24hr technical support center for troubleshooting and technical assistance.

High Speed Telemetry Provider: Baker Hughes

Drilling Tools

IntelliServ will support leading drilling tool vendors to provide wired versions of a range of drilling tools including jars, accelerators, underreamers, roller reamers, and bypass subs. In addition, IntelliServ will now enable and support the drilling tool vendor in wiring and servicing these tools at their own local facilities.

Along String Measurements (ASMs)

IntelliServ is now licensing MWD and measurement providers to develop their own Along String Measurement tools which run on WDP. Such tools are limited to mechanical measurements including pressure, temperature, vibration, bending, torque, tension and borehole caliper. Our Partner Support and Integration Team is committed to helping partner’s develop tools quickly and efficiently.

Along String Measurement Provider: Dynamic Drilling Solutions

Inspection, Repair & Maintenance

IntelliServ can now license local suppliers to provide inspecation, repair and maintenance on WDP where required. IntelliServ currently has inspection, repair and maintenance capabilities (either directly, or with local suppliers) in Aberdeen, UK; Stavanger, Norway; Al Khobar, Saudi Arabia; Williston, North Dakota; and Provo, Utah. IntelliServ has also established a North Sea DataLink repair and maintenance facility in Stavanger, Norway.

Pipe Handling

Proper running and handling procedures are imperative to maximize performance, extend the life, and reduce the overall cost of drill pipe and BHA components. Proper running and handling procedures aid in the prevention of downhole makeup, shoulder-separation, washout, and high break-out torque.

To learn more about the proper Running & Handling Procedures: www.nov.com/grantprideco/runningandhandling

For Additional Information: IntelliServOrders@nov.com

D392004875-MKT-001 Rev. 03

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