

FRACPRO: Frac Smarter, Make More Money

Neill Northington, Vice President of Software

Matt Conway, Software & Training Manager

FRACPRO

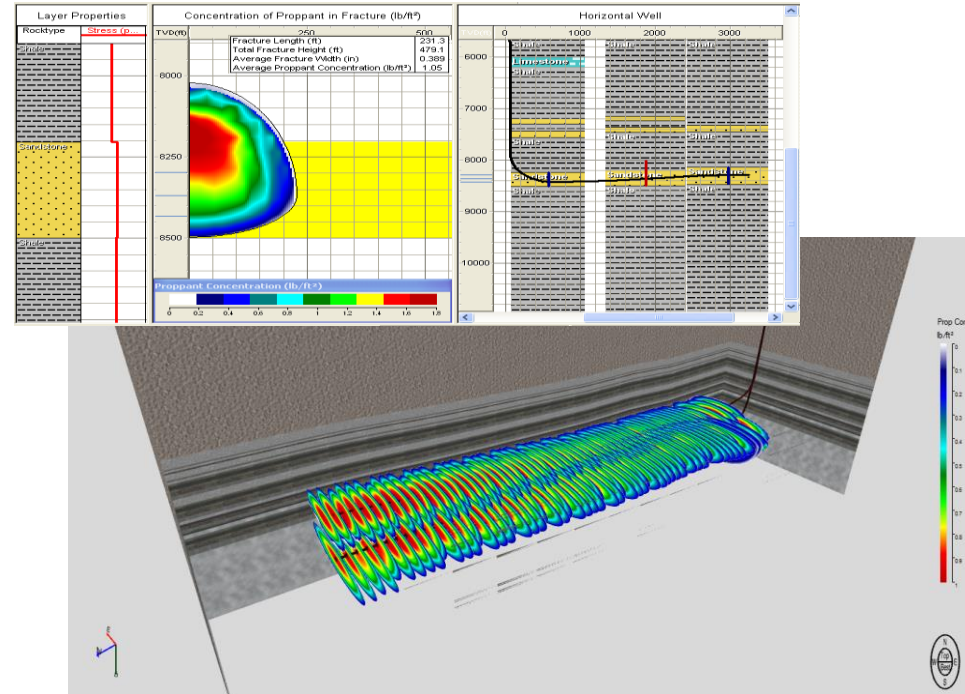
- **Most Economical Diagnostic Available for Your Fracture**

- Who Engineers Your Fracs?
- Fracs are Expensive – Design Them
- Feedback from the Job Provides Insight

- **Used by Hundreds of E&P's and Service Companies**

- **Most widely Used Frac Design and Analysis Software in the Industry**

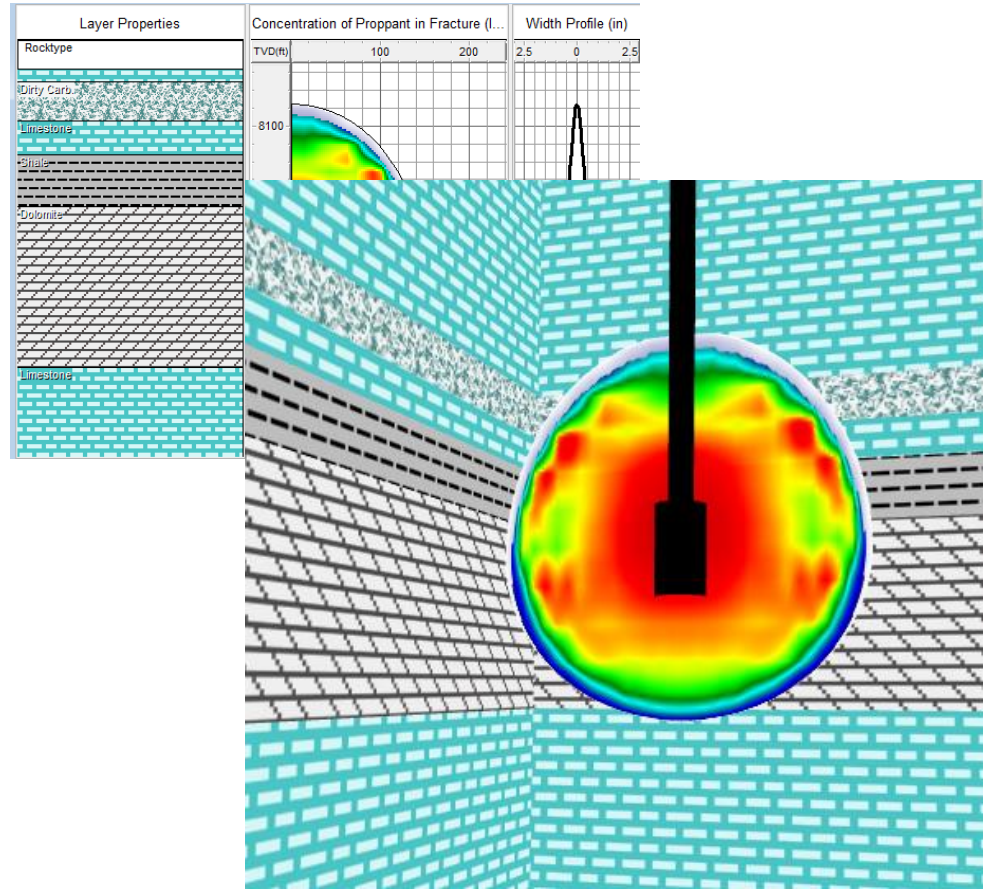
- Over 5,000 Licenses in Use
- Licenses on 6 Continents
- English, Chinese and Russian



Original Design

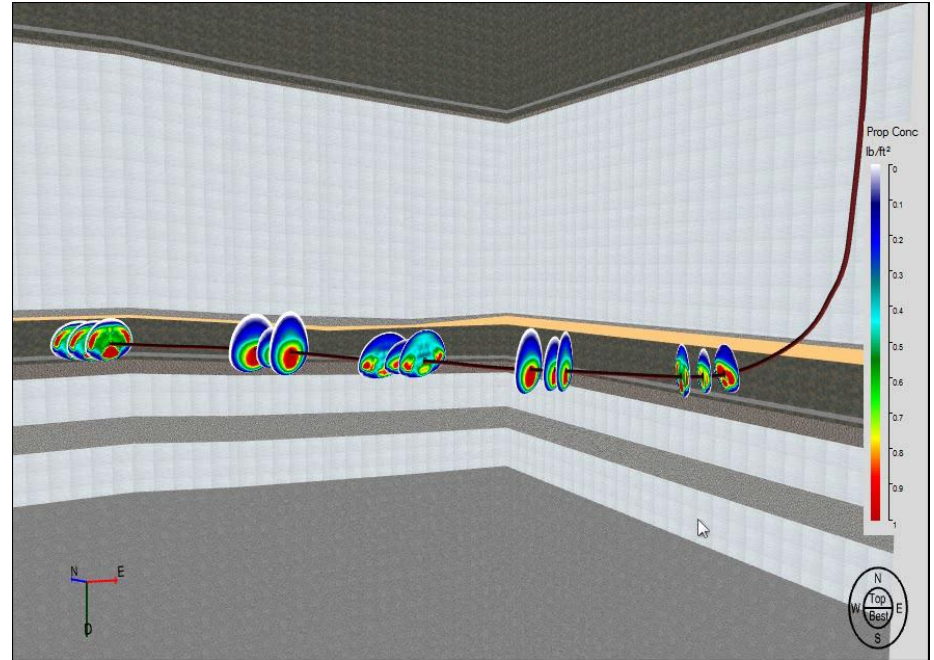
- One Wellbore
- One Reservoir Description
- One Treatment
- Single Results
- Vertical Well Focused

- **Quick Computation**
- **Design – Real Time – Post Job**



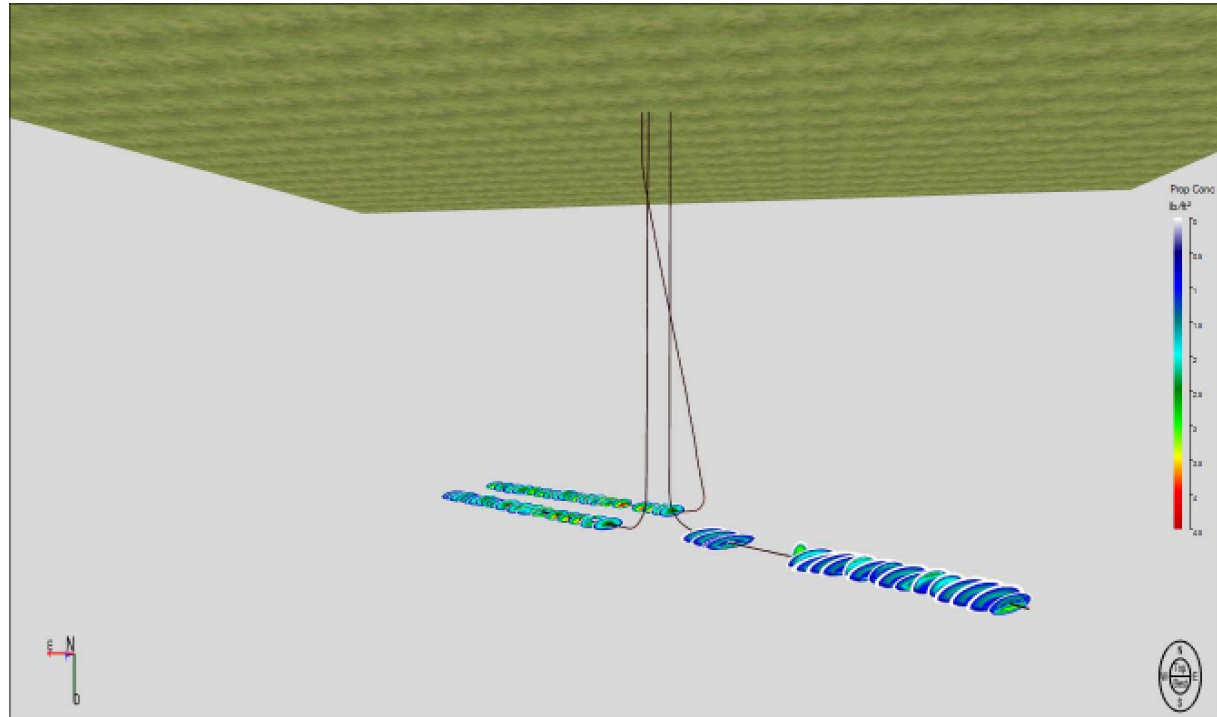
Multiple Treatments

- Extended Software to Allow Multiple Treatments in One File
- Also Define Reservoir Description to Describe Dipping Wellbores and Formations
- **This Allowed Horizontal Simulations to be Easily Performed**
- **Better visualization of Results**



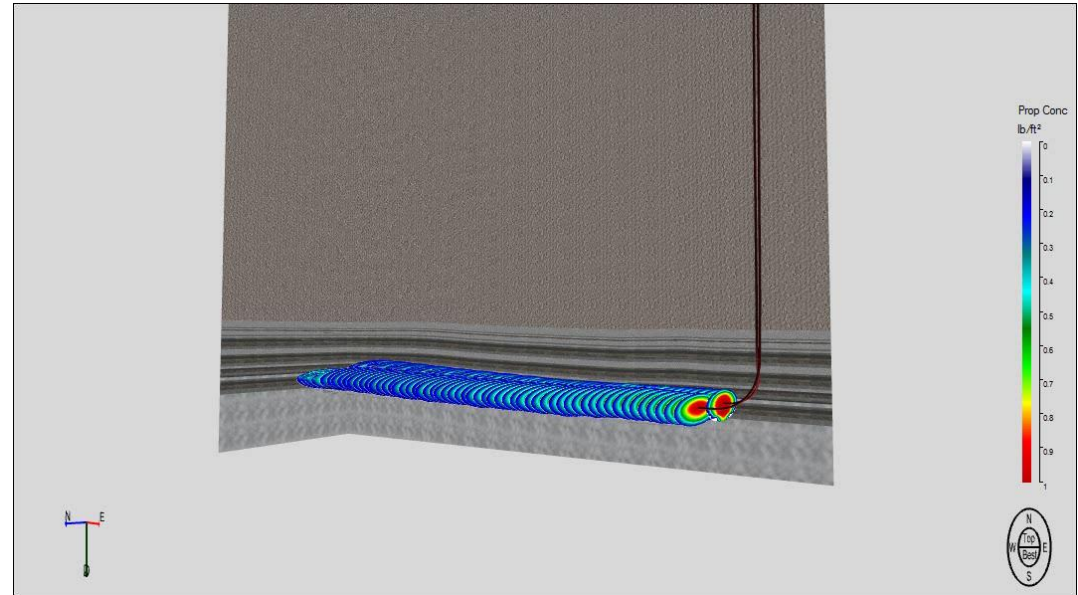
Now - Multiple Wellbores

- Software Handles Multiple Wellbores with Multiple Treatments
- Allows Simulation of Zipper Fracs
- **Visualization Tools Show “Missed Spots” in the Completion**
- **This is Lost EUR**



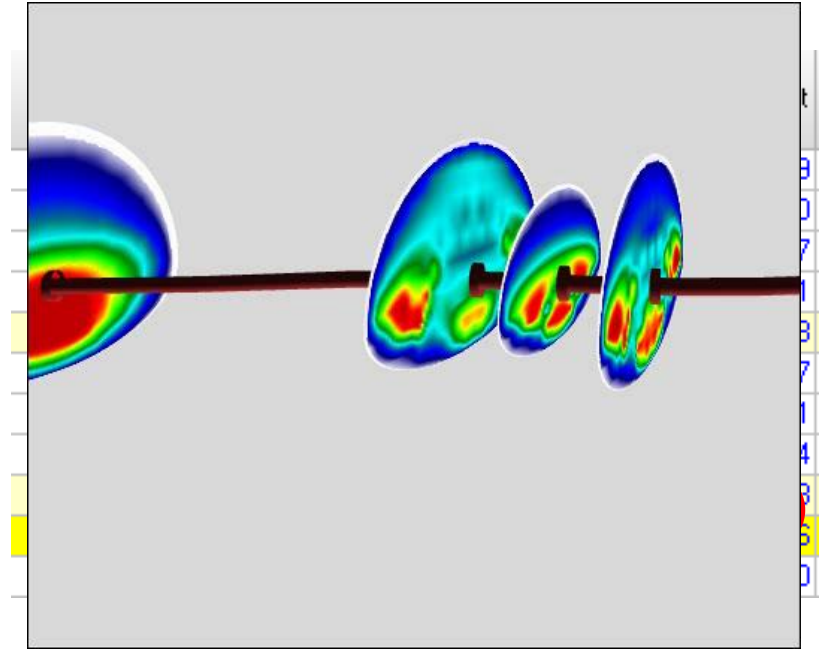
Multiple Wellbores – Zipper Frac

- Simulate Alternating Pumping Operations
- Simplified 1 File Design for Whole Field
- **Optimize Spacing and Number of Fracs**
- **Model Stress Interaction of Fractures**



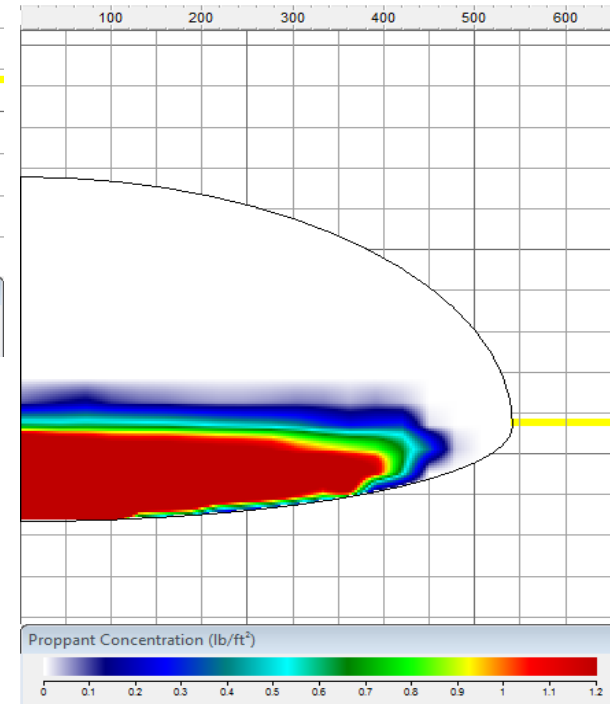
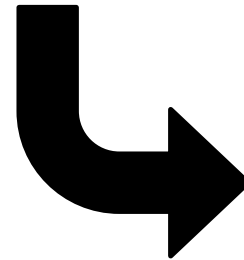
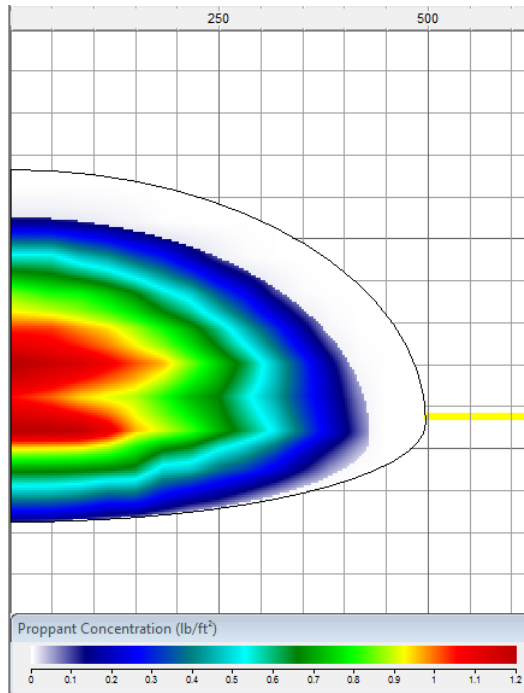
Multiple Wellbores - Stress Shadowing

- FRACPRO Models Calculates Stress Field Changes as Fractures are Pumped Every Time Step
- **Investigate Altered Geometry and Additional Pressure Required**
- **Model Effects on New Wells in Old Fields**
- **Effects of Adjacent Wellbores Fractures Calculated on Current Fracture**



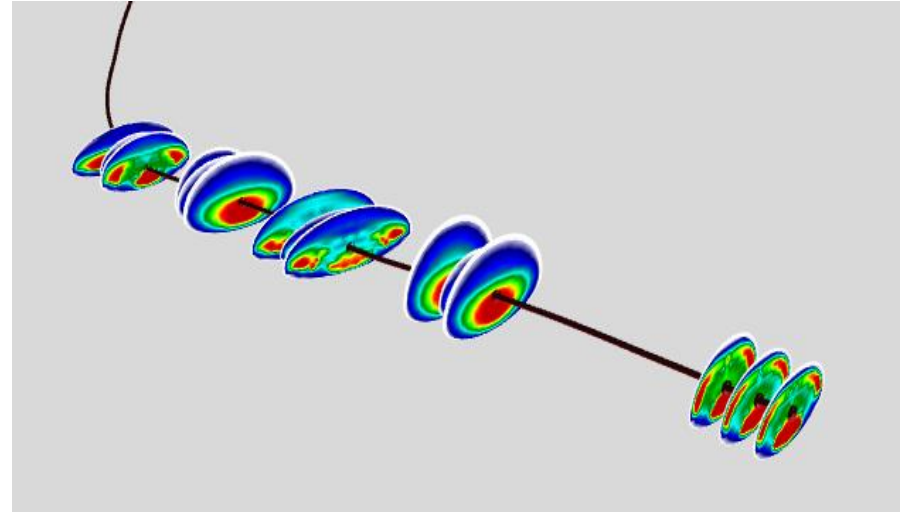
3D Fluid Transport

- New Finite Difference Fluid and Proppant Transport Model
- Accurate Settling and Banking Conditions for Low Visc Fracs
- Real-world Proppant Placement and Conductivity
- Settling Matters in Water Fracs



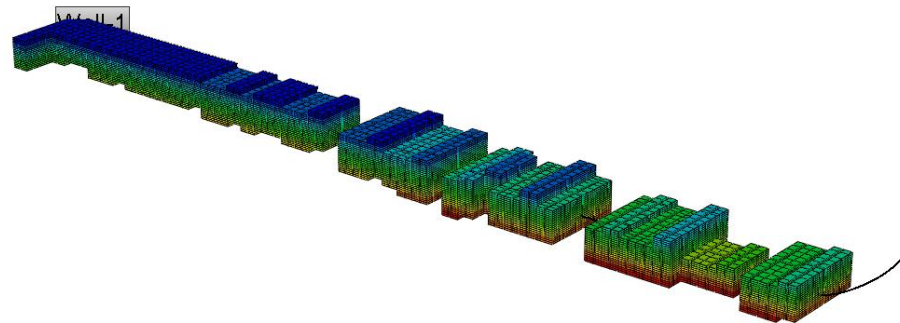
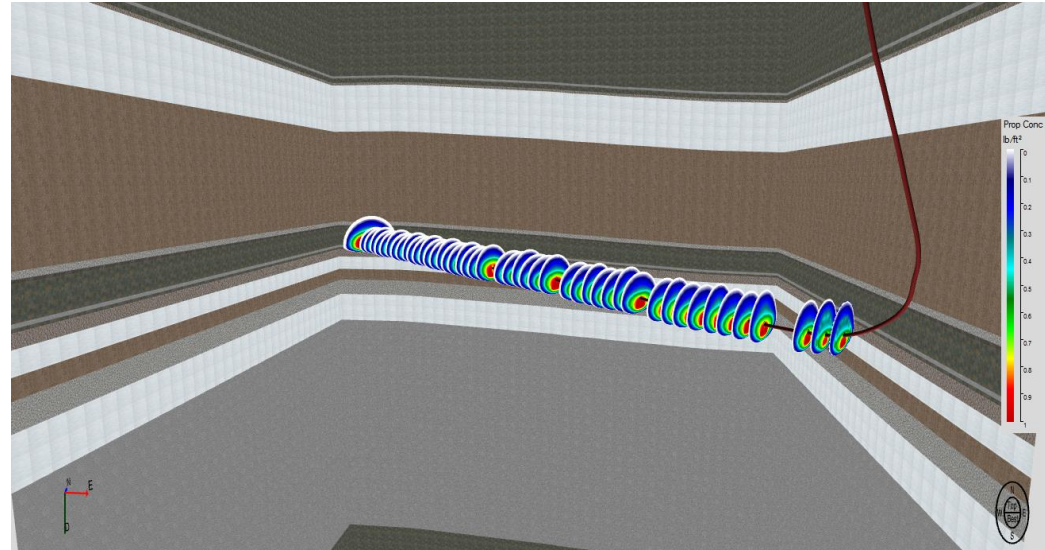
Reservoir Model Improvements

- FRACPRO Internal Reservoir Model Now Models Production for Entire Horizontal Well
 - All Fracs Considered for Reservoir Drainage
- Run “What-If?” Scenarios with Variations on Spacing and Number of Fracs
- **Optimize Reservoir Drainage with Correct Spacing**
- **Determine “Effective Frac Size” to Maximize ROI**



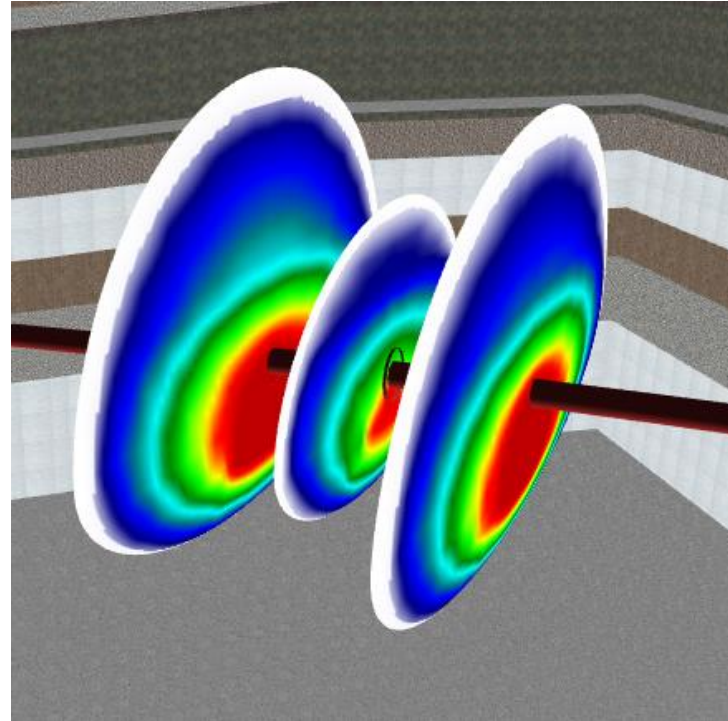
Reservoir Model Integration

- Improved Connections to 3D Simulators
 - CMG Builder
 - Send Conductivity for Entire Well
 - Eclipse
 - Generate Complete Eclipse Input File
 - Rel Perm Now Done in FRACPRO
 - Quicklook
- **Model “REAL” Conductivity**
- **Seamless Transitions between Completion & Reservoir Teams**



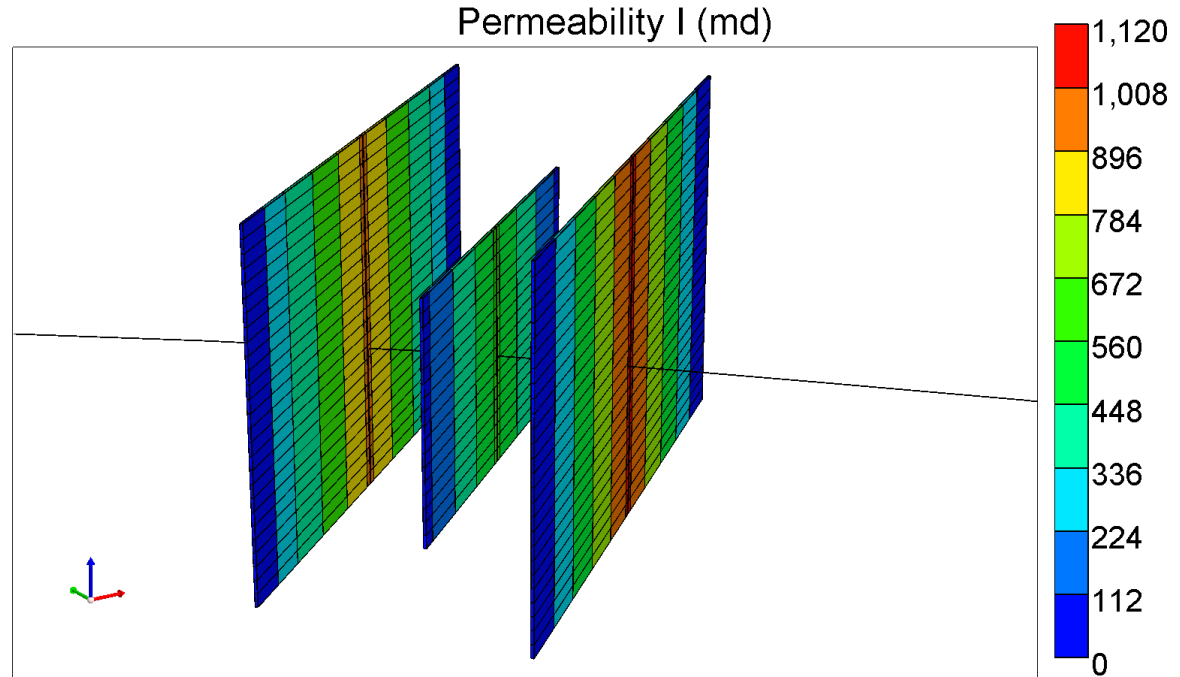
Reservoir Model Integration - CMG

- CMG's Builder Tool
 - Automatically Takes Frac Results from FRACPRO and Grids
- One Frac



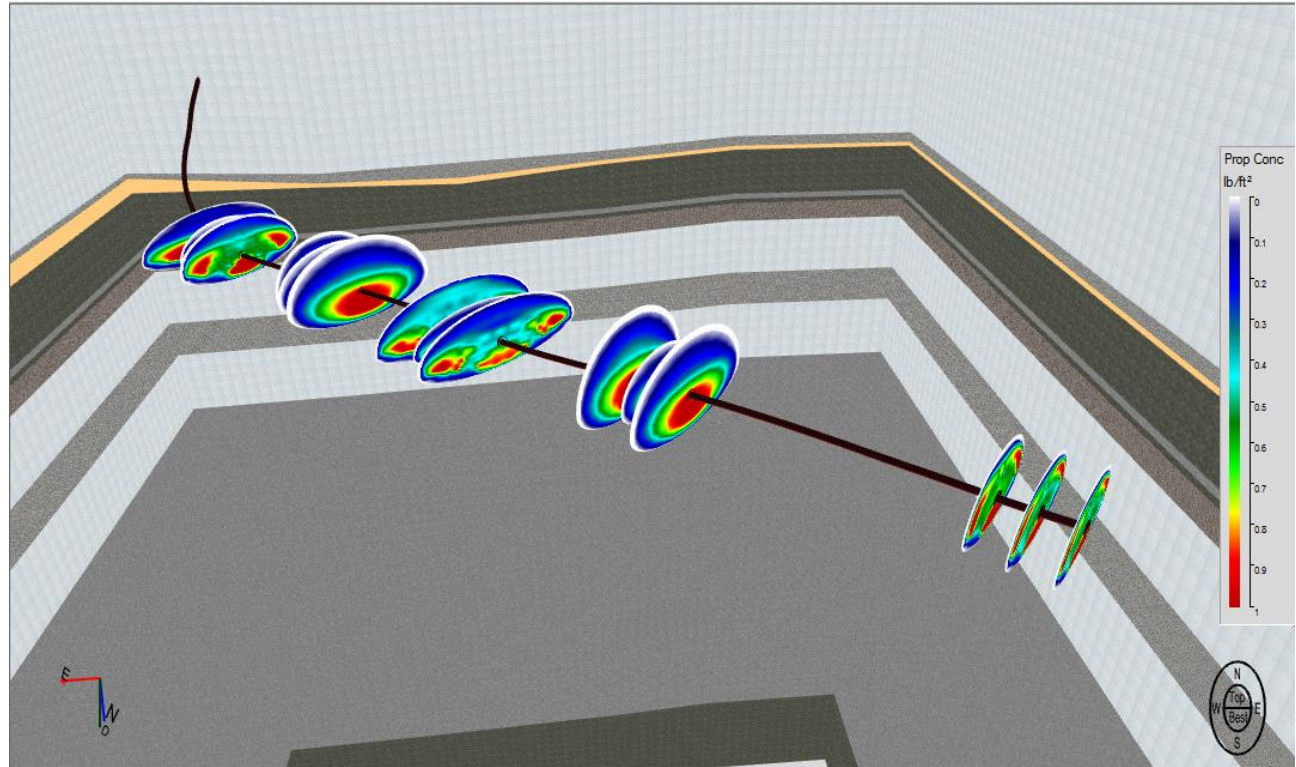
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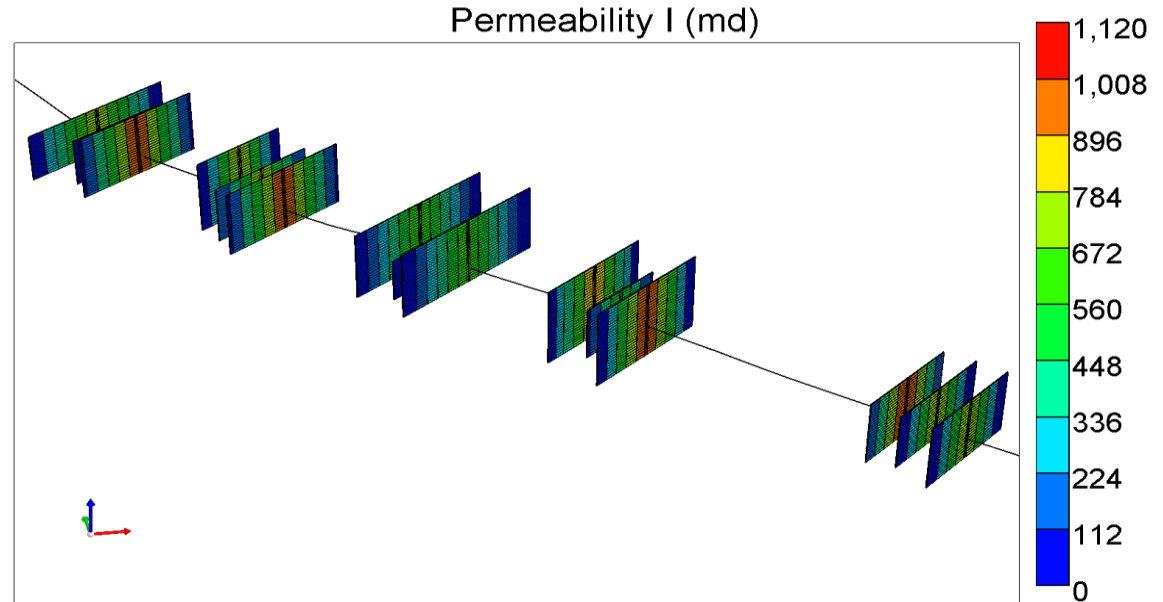
Reservoir Model Integration - CMG

- CMG's Builder Tool
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- Or All of Them

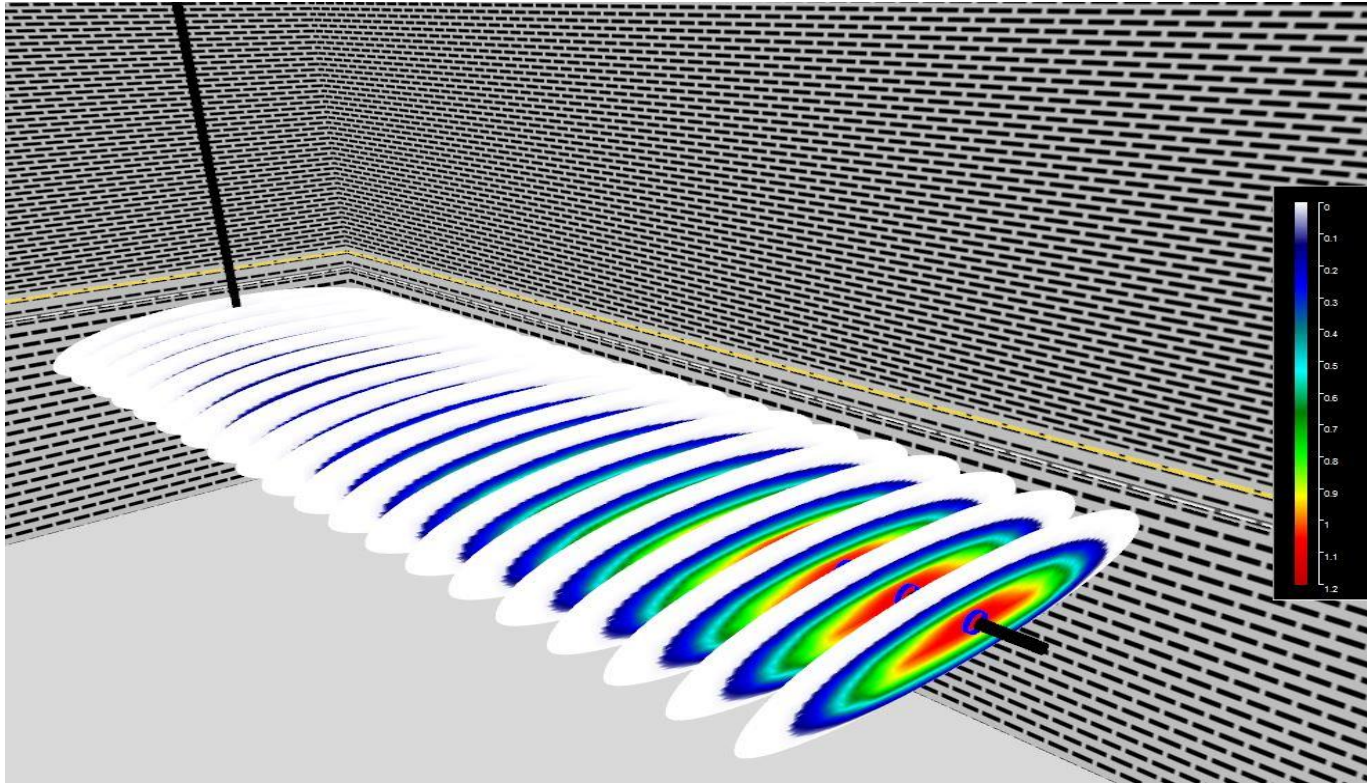


Reservoir Model Integration - CMG

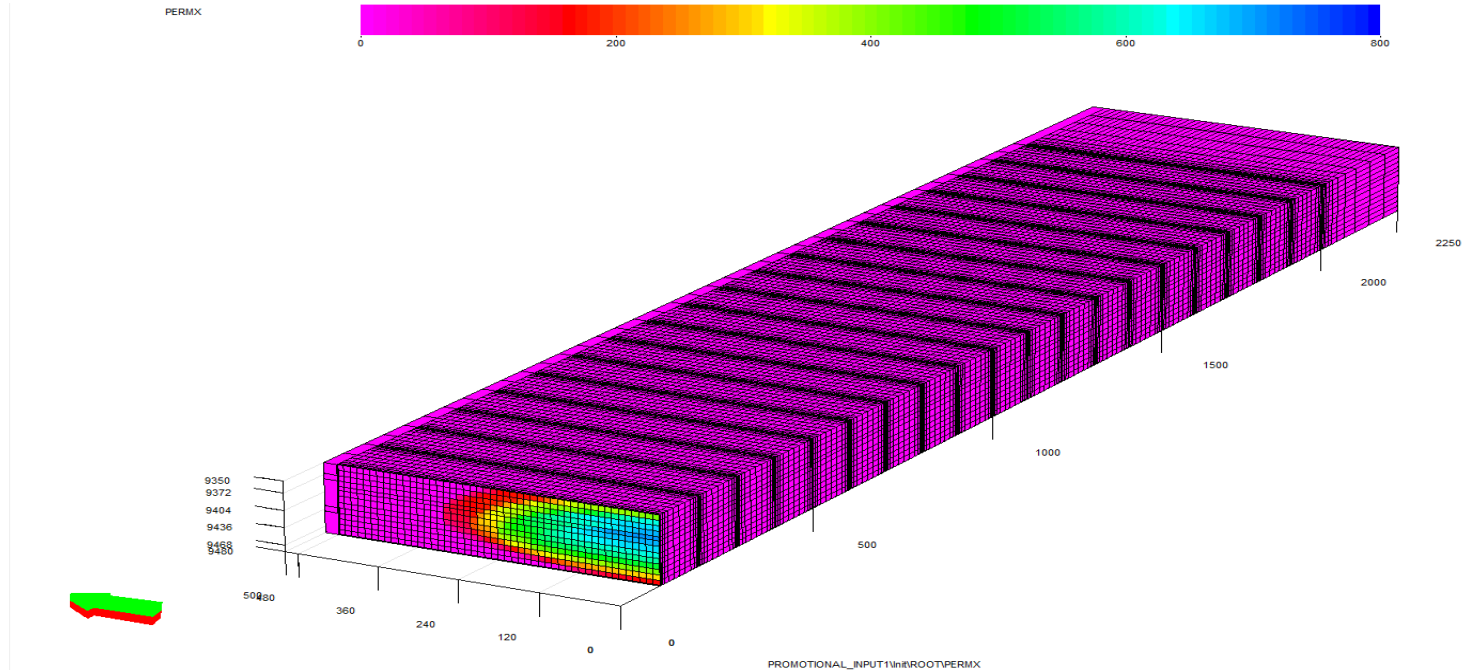
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- Or All of Them



FRACPRO Results – Ready for Eclipse

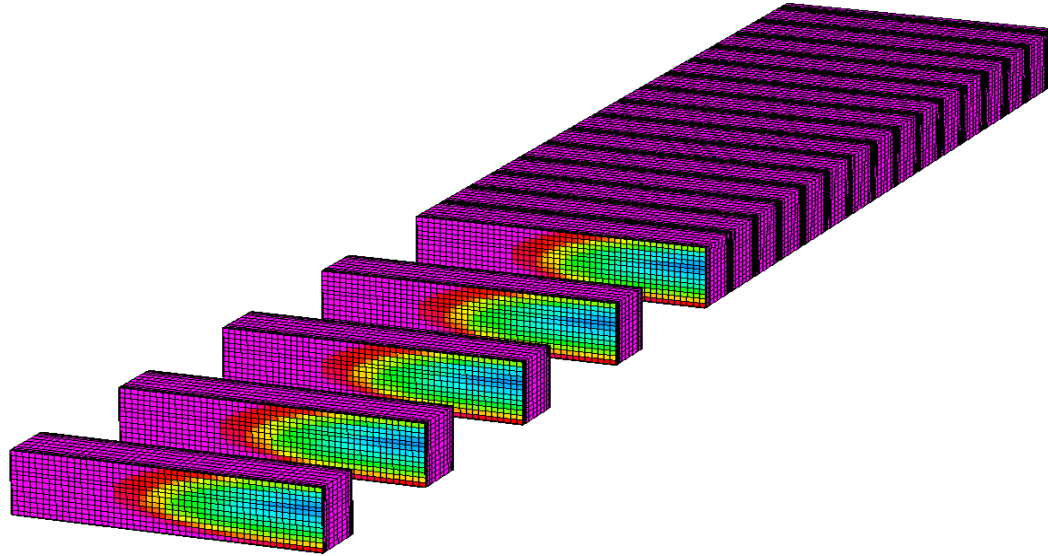
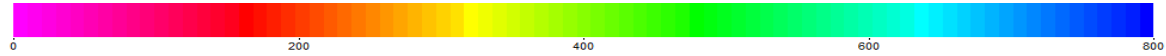


FRACPRO Results – Gridded and Imported to Eclipse

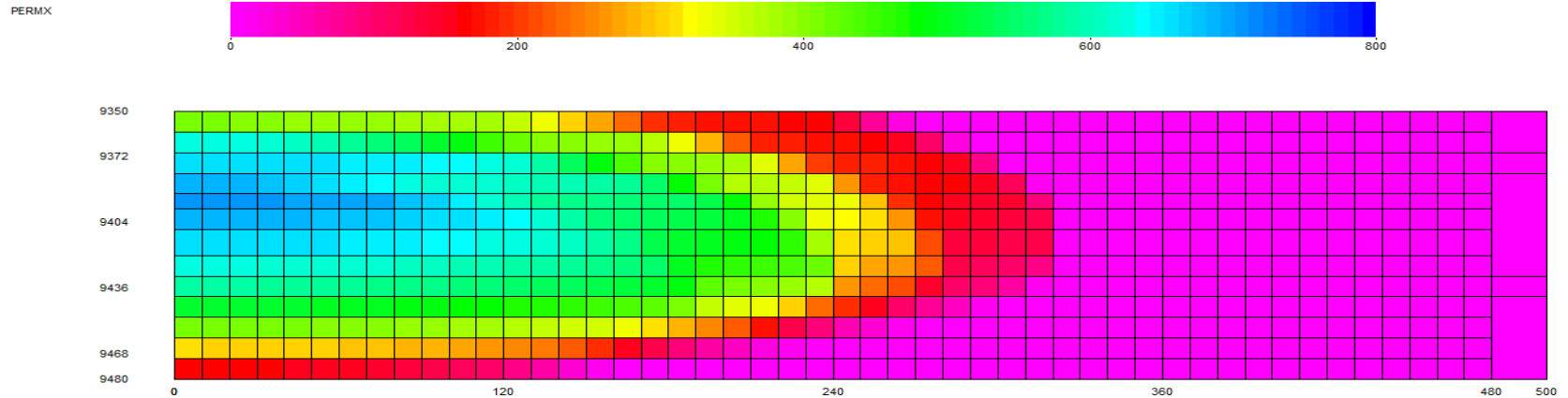


FRACPRO Results – Gridded and Imported to Eclipse, Detail

PERMX



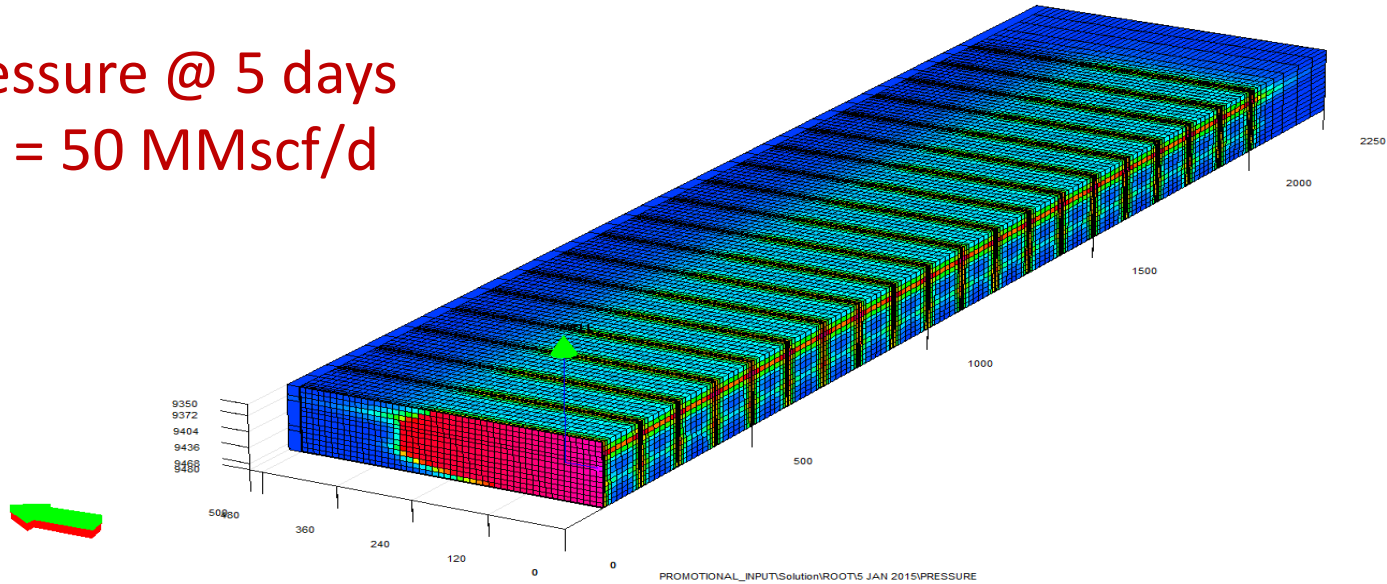
FRACPRO Results – Perm Detail - Eclipse



FRACPRO Results – Flowing Pressure in Eclipse

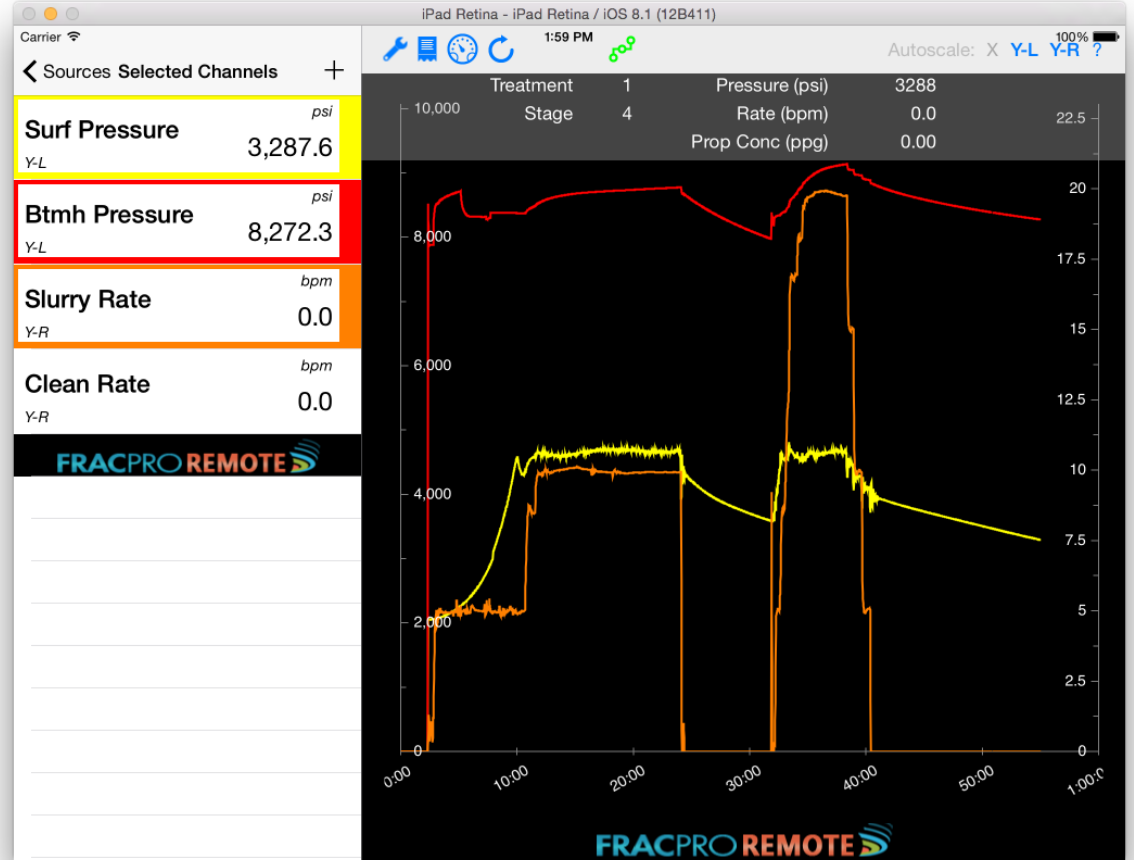


Pressure @ 5 days
 $Q_g = 50 \text{ MMscf/d}$



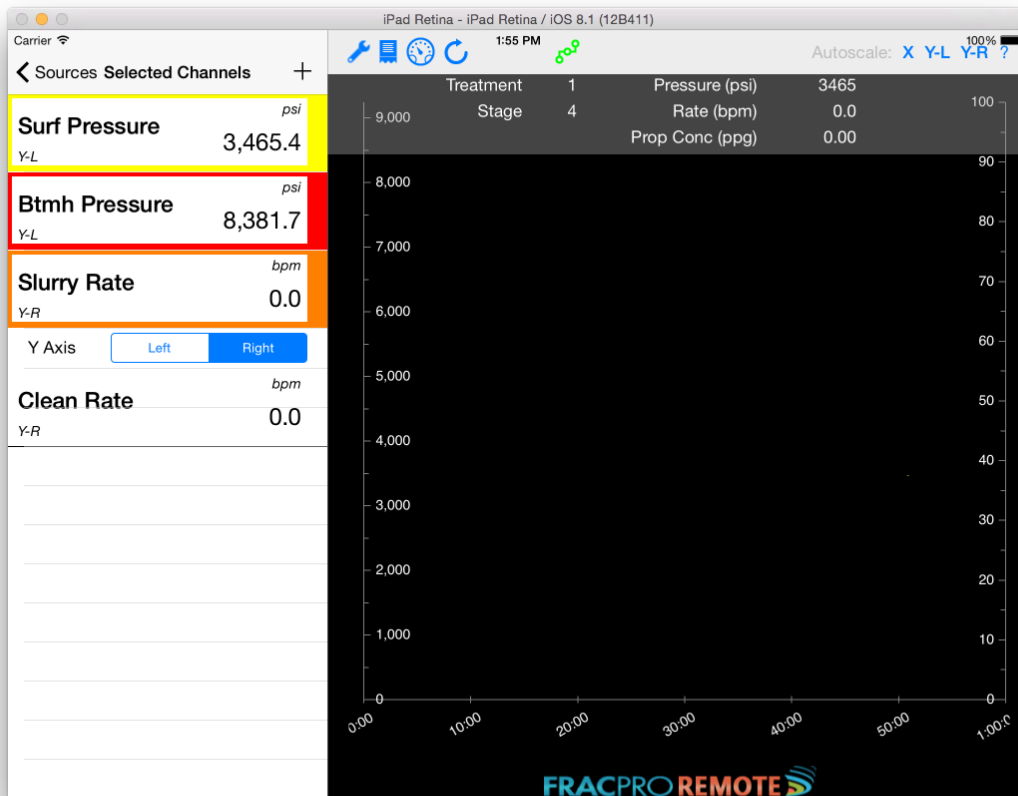
FRACPRO REMOTE

- An App from Apple Store
- Connects Mobile Device to FRACPRO Data



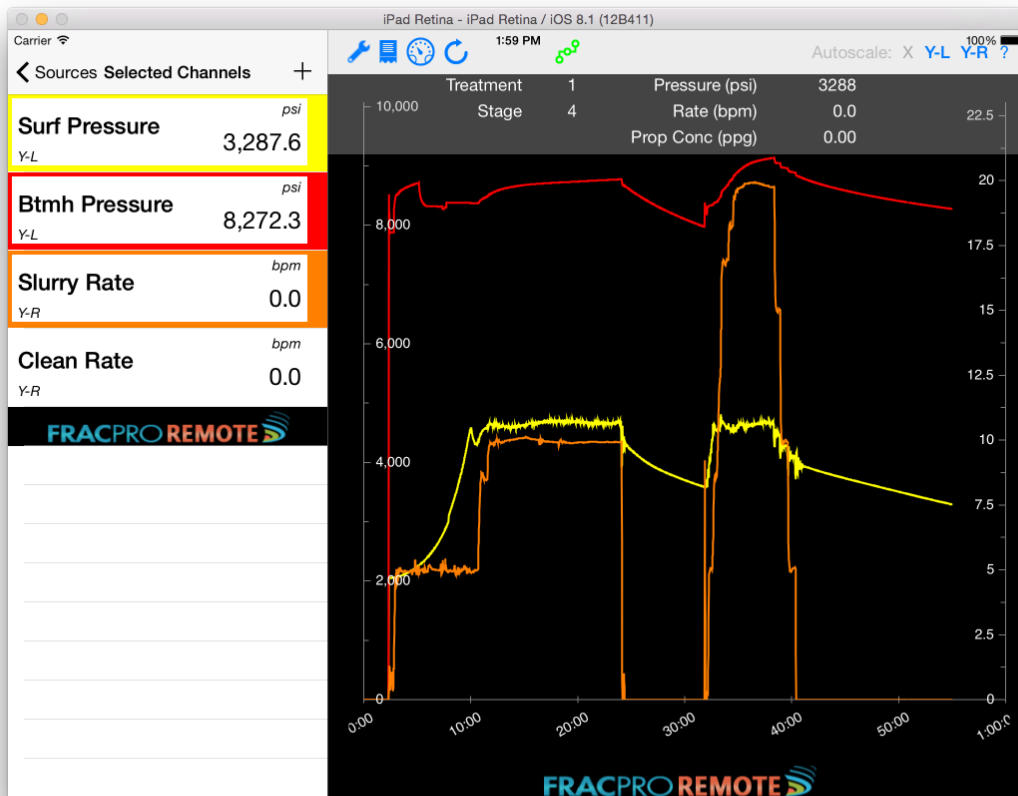
FRACPRO REMOTE

- An App from Apple Store
- Connects Mobile Device to FRACPRO Data
- Select Data



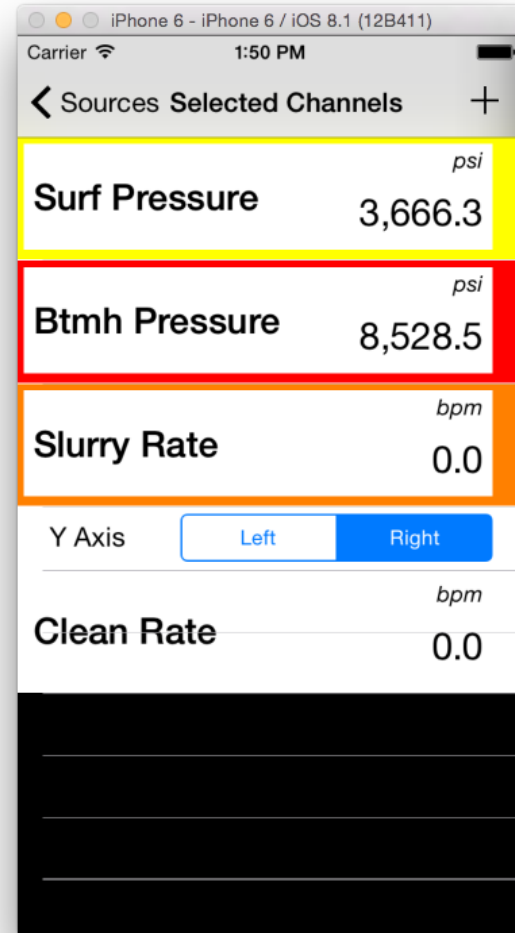
FRACPRO REMOTE

- An App from Apple Store
- Connects Mobile Device to FRACPRO Data
- Plotting Begins
- Fills Historical Data



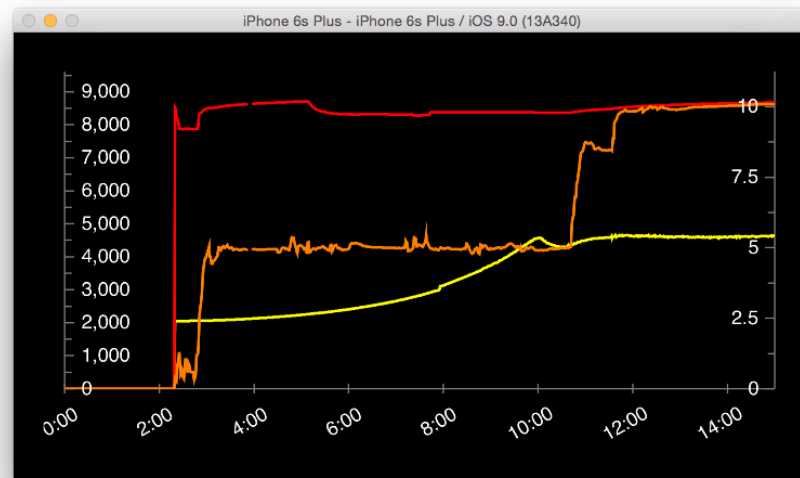
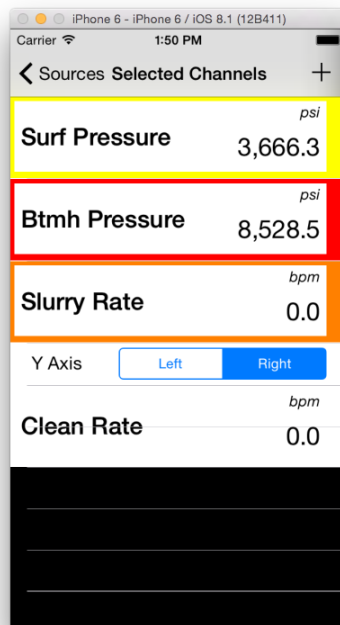
FRACPRO REMOTE

- An App from Apple Store
- Connects Mobile Device to FRACPRO Data
- Same Process for iPhone



FRACPRO REMOTE

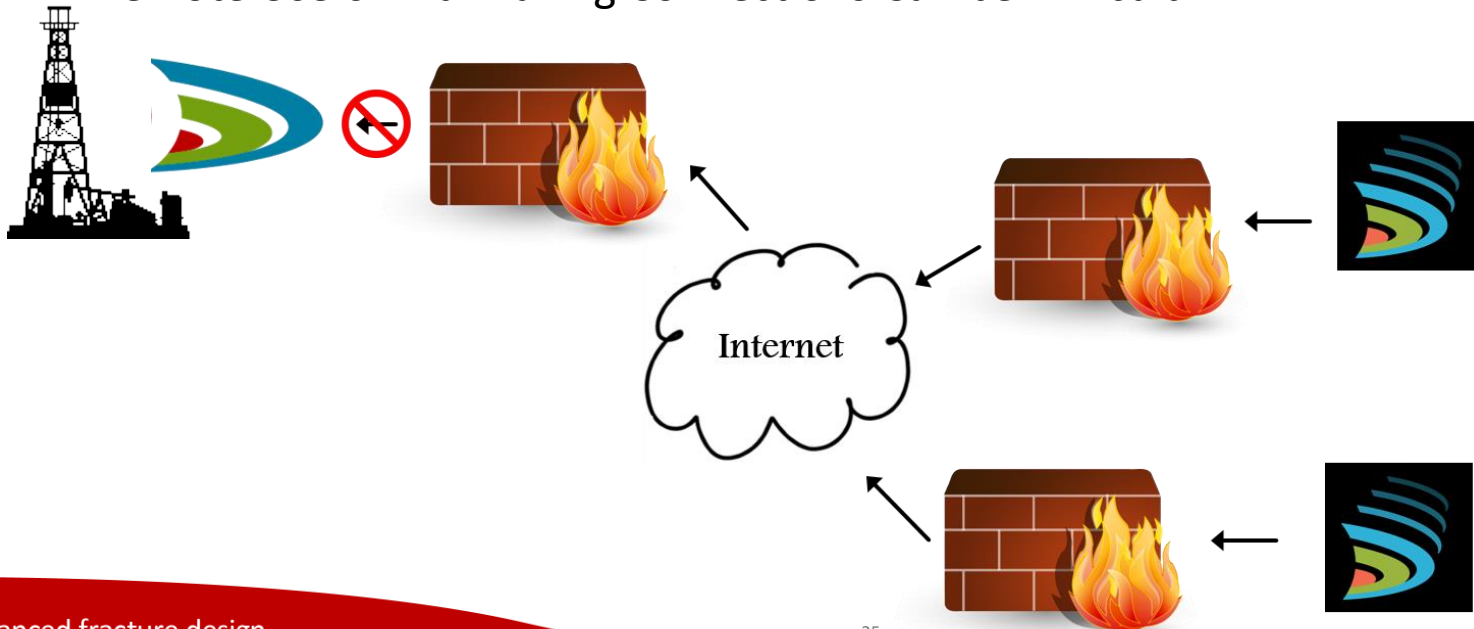
- An App from Apple Store
- Connects Mobile Device to FRACPRO Data
- **Data Displays on Side**



FRACPRO REMOTE

- The Problem

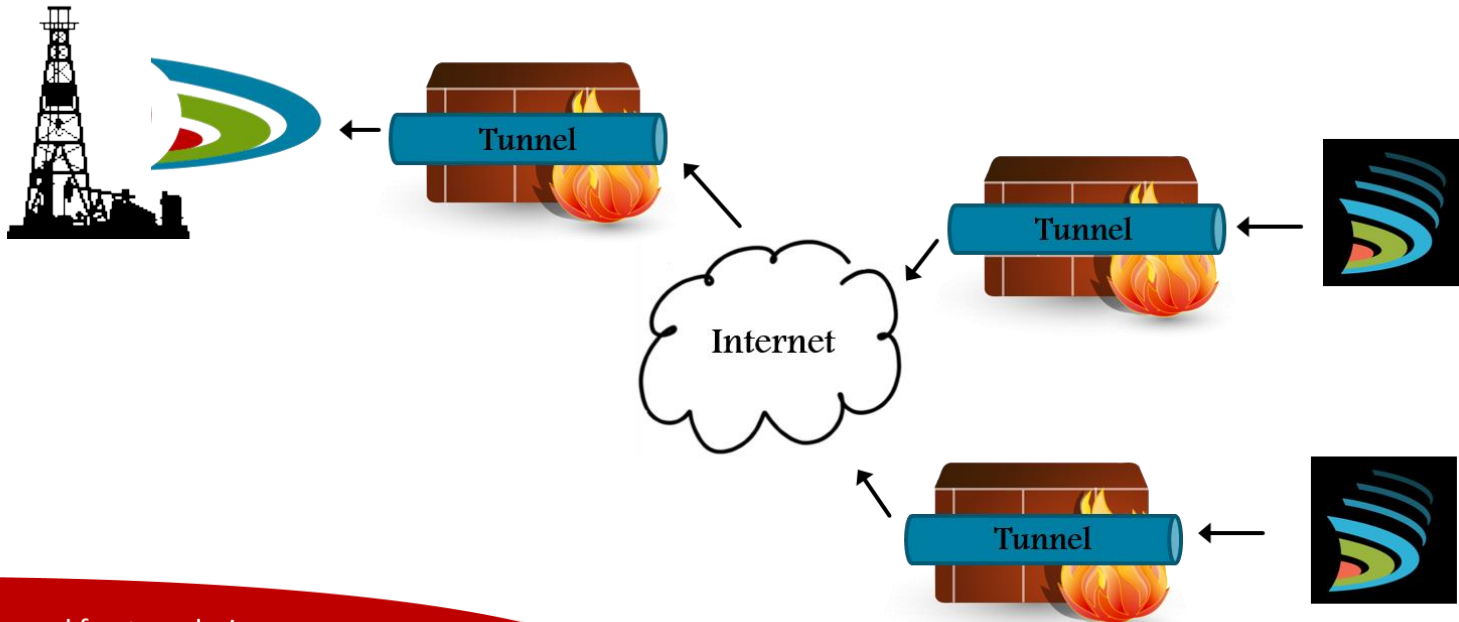
- Network Gateways and Routers Obscure and Complicate Connections by Hiding IP Private Addresses
- Remote Users Find Making Connections Can be Difficult



Tunneling with FRACPRO REMOTE

- The Solution

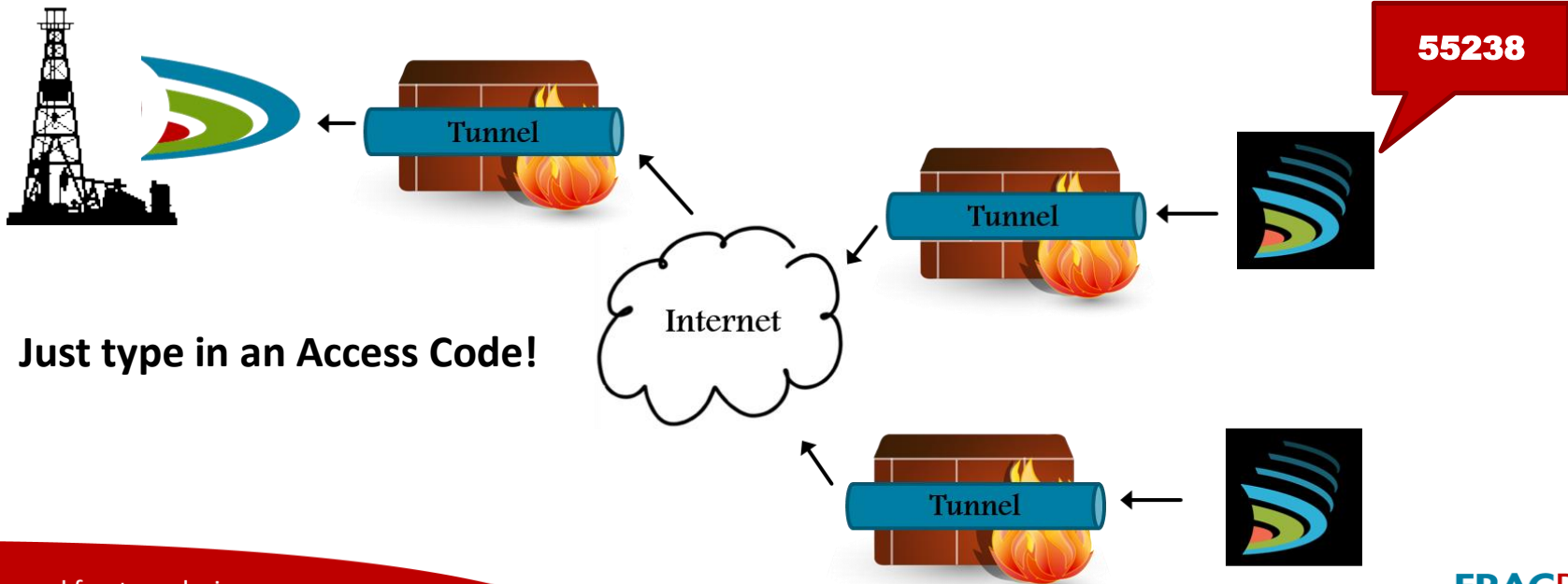
- FRACPRO Uses Existing Networking Standards For TCP, ICE and STUN Protocols to Seek an Appropriate Connection Point and Establish a Connection



Tunneling with FRACPRO REMOTE

- The Solution

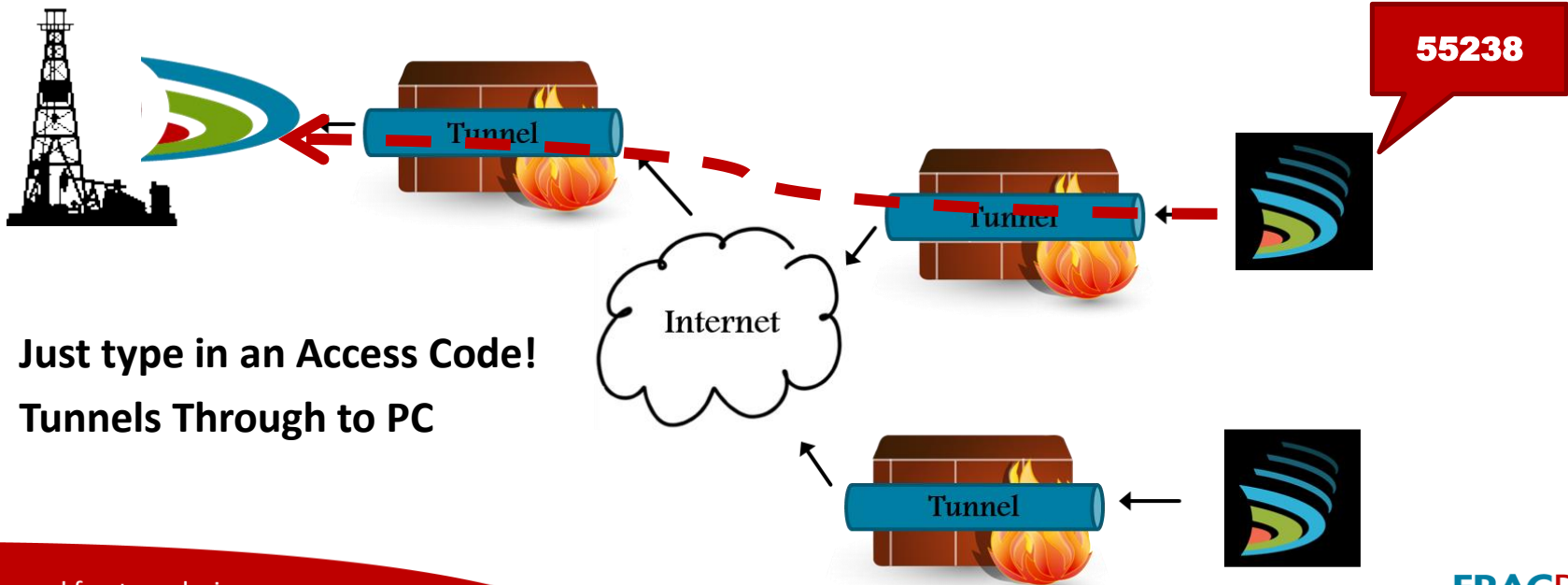
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- Just type in an Access Code!

Tunneling with FRACPRO REMOTE

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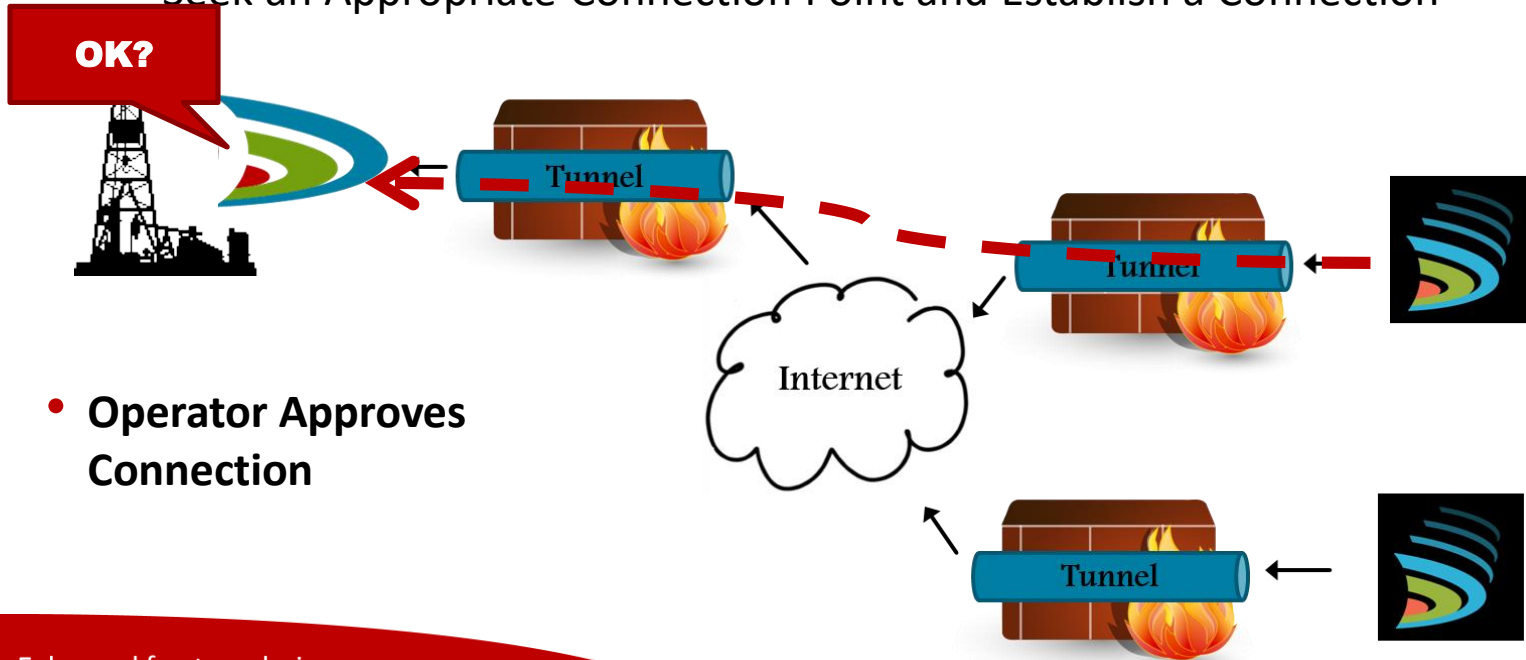


- Just type in an Access Code!
- Tunnels Through to PC

Tunneling with FRACPRO REMOTE

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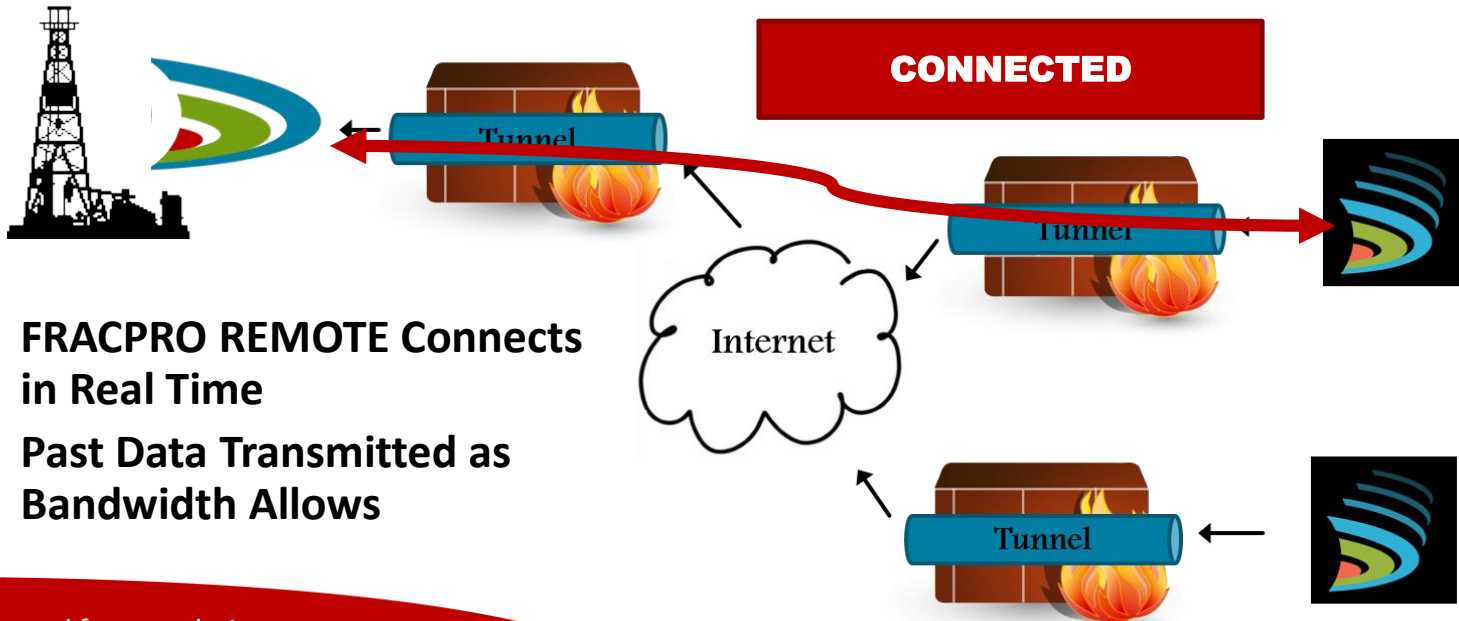


- Operator Approves Connection

Tunneling with FRACPRO REMOTE

- The Solution

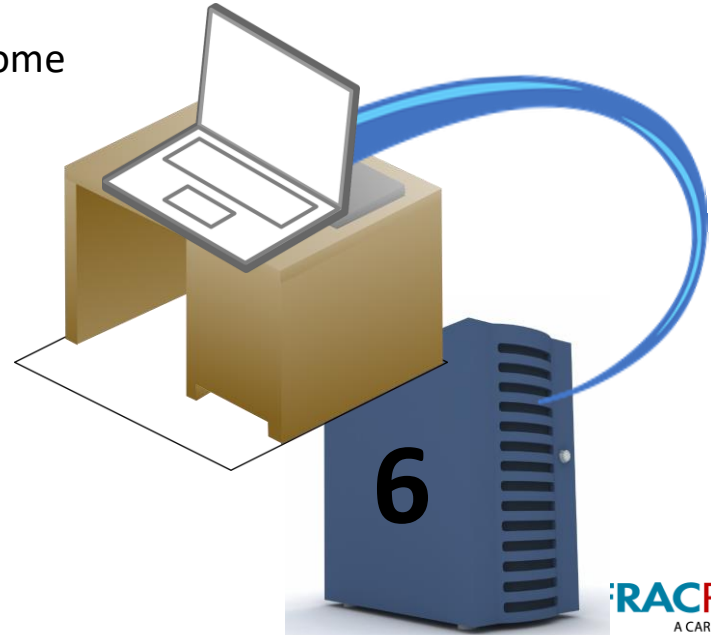
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- **FRACPRO REMOTE Connects in Real Time**
- **Past Data Transmitted as Bandwidth Allows**

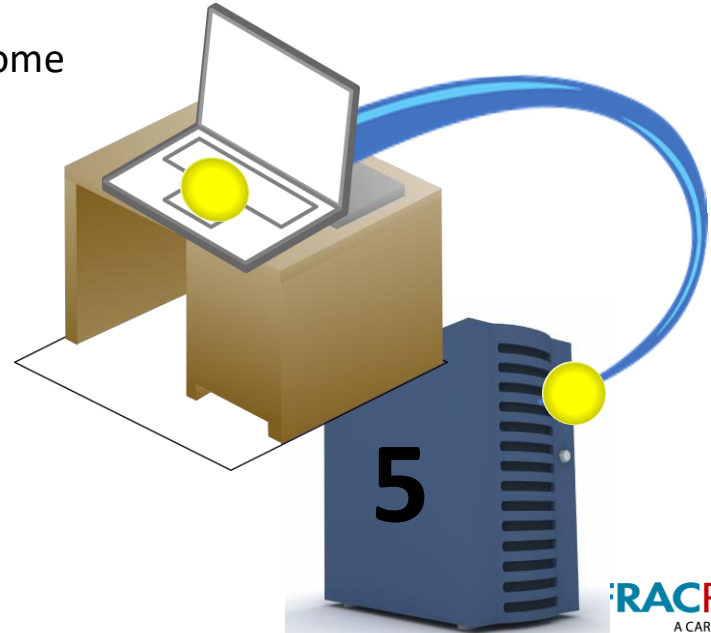
Commuter Licensing

- **Licenses can be Checked Out from a Network Server**
 - Commuter Feature
 - Allows Network Licenses to Reside on a Local PC
 - PC can be Offline and FRACPRO Still Works
 - License can be Checked In or Will Automatically Come Back After a Time Period
- **Enable Remote Users**
- **No USB Licenses to Keep Up With**

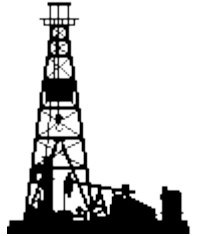


Commuter Licensing

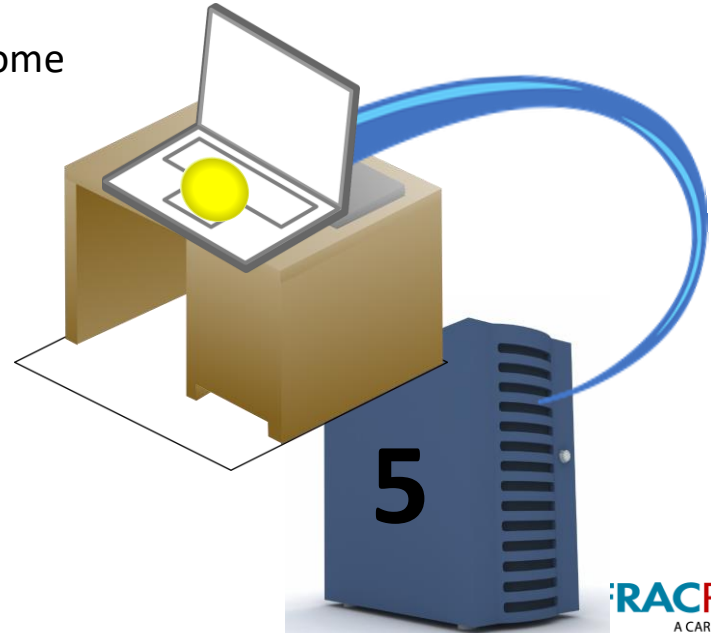
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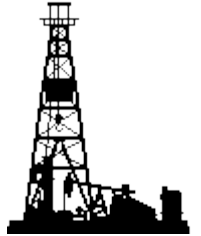
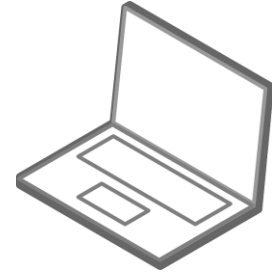


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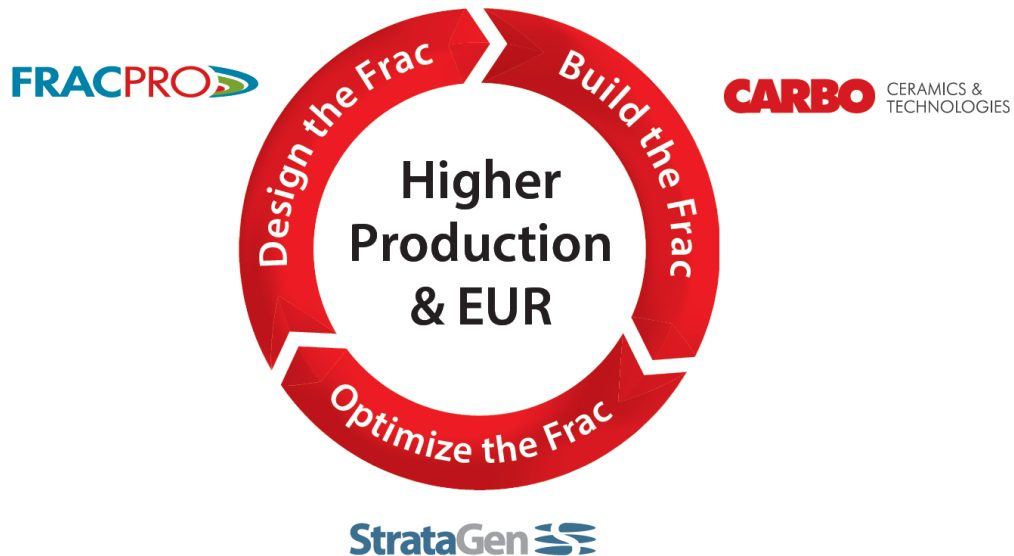


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Thank You!



Questions?