

# Locating Underground Piping

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# Agenda

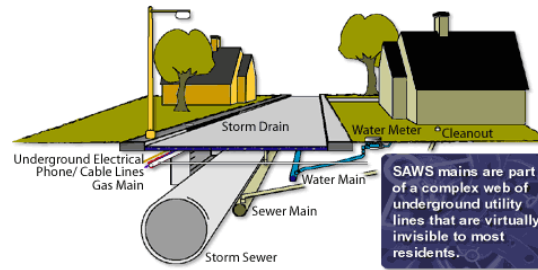
- Why & what we locate
- Alternative locating techniques
  - Dowsing
  - Ground penetrating radar
  - Hydro / vacuum excavation
- Electro magnetic location
- Questions











## Why we locate

- To determine where underground utilities are located before digging takes place
- Reduce the chance of damaging underground utilities
- Enables planning of work near underground utilities
- Proper location of underground utilities means less impact on customers and other organizations





**Color Code for Marking Underground Utility Lines**

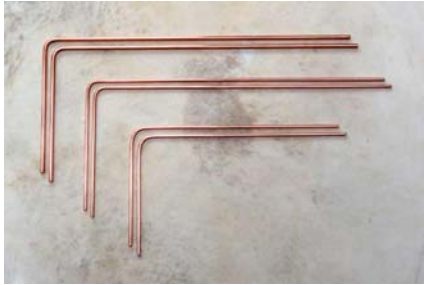
	Electric
	Gas-Oil-Steam
	Communication CATV
	Potable Water
	Irrigation, Reclaimed Water, Slurry Lines
	Sewer
	Temporary Survey Markings
	Proposed Excavation

# Why & what we locate

# Dowsing

- A type of divination employed in an attempt to locate ground water, buried metals or ore, gemstones, oil, gravesites etc.
- There is no scientific evidence that it works any better than chance
- Many people's personal experience suggests that it works reliably





# Dowsing

# Dowsing

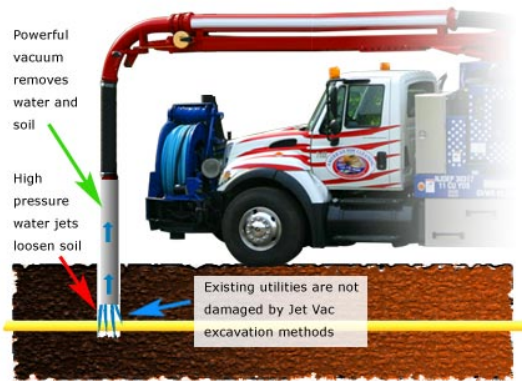


# Hydro / Vacuum Excavation

- High pressure water and a powerful vacuum used to remove earth / fill, exposing underground utilities
- Often referred to as “post-holing” or “daylighting”
- Can be very difficult or impossible depending on what the ground is like





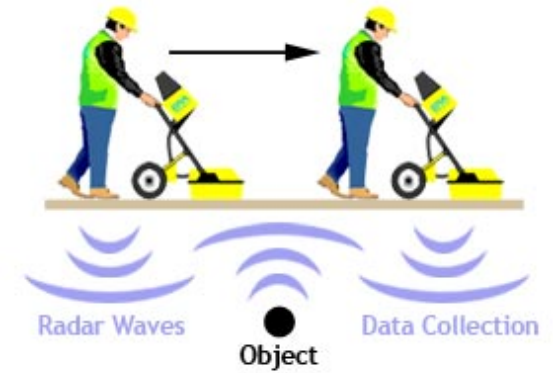
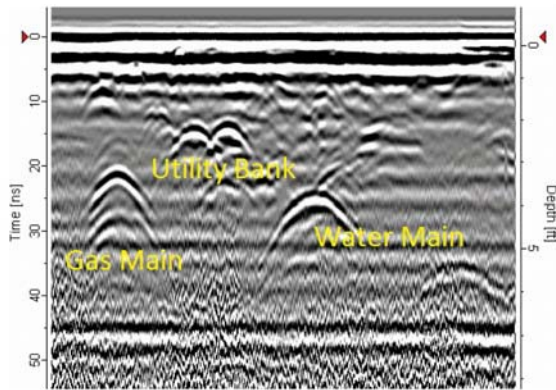


# Hydro / Vacuum Excavation

# Ground Penetrating Radar

- Earth sciences use it to study bedrock, soil, ground water and ice
- Military uses include detection of mines, unexploded ordinance and tunnels
- Locating graves and buried evidence.
- Locating underground utilities
- Some types of ground make using this impossible





# Ground Penetrating Radar

## Electromagnetic Locating

Principles of electromagnetism  
have been understood since  
the early 1800s

We've been using them to locate  
underground cables since the  
early 1900s



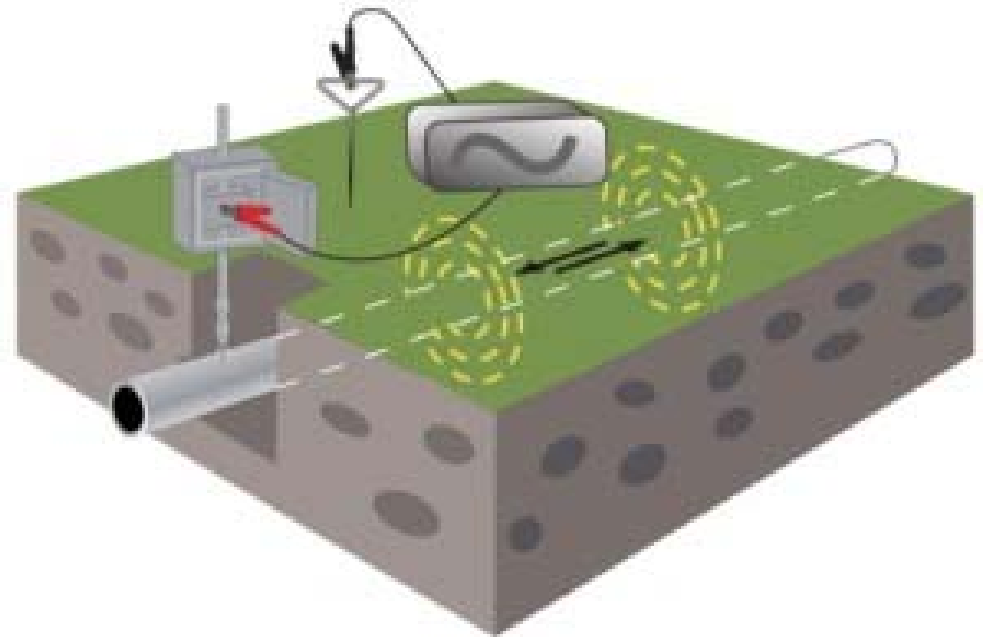




# Electromagnetic Location

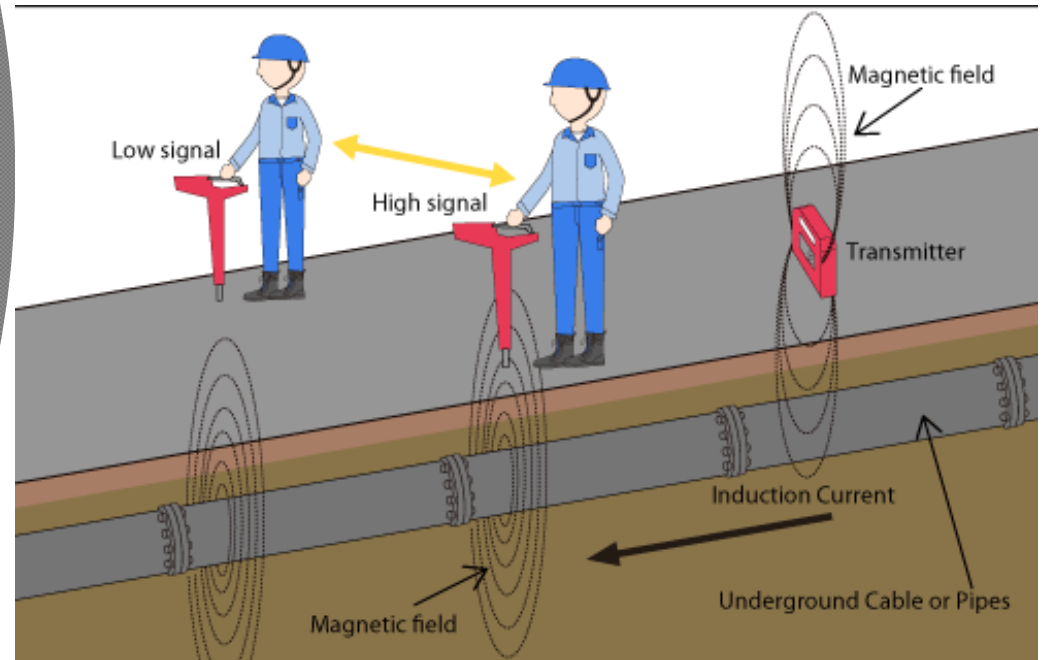
# Electromagnetic Locating

- We need to impose a signal onto a buried conductor by subjecting it to a magnetic field setup by an AC signal transmitter



# Electromagnetic Locating

- We detect a signal in a buried conductor by amplifying the tiny voltages induced by its field in the aerials of a receiver

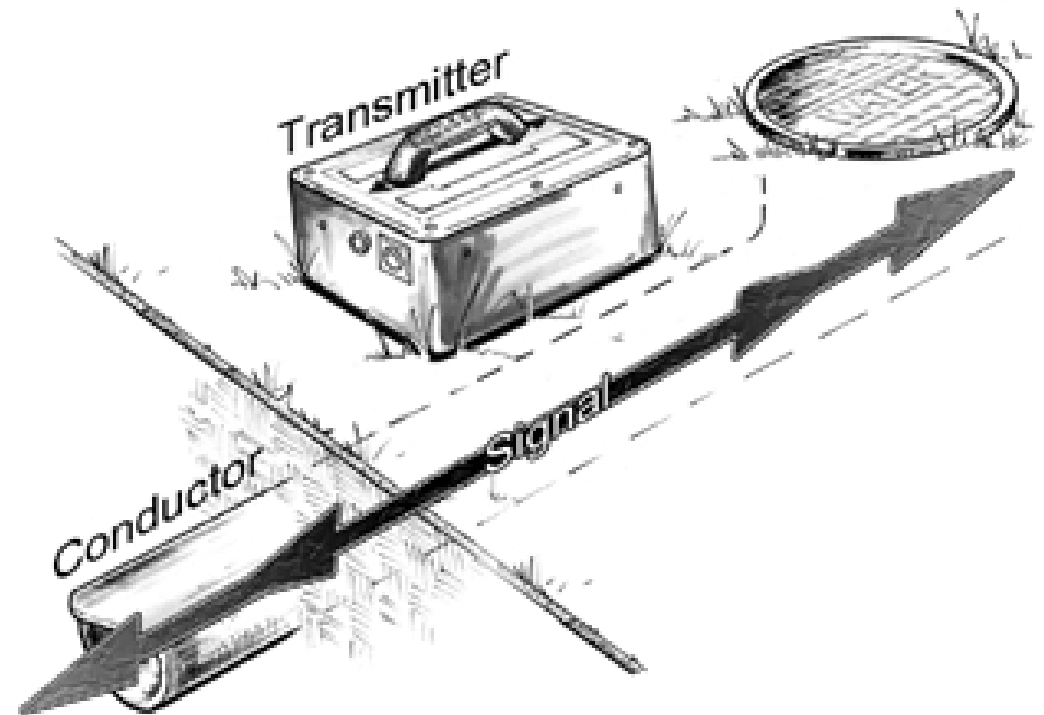


# Electromagnetic Locating

- Induction

Energizes a conductor without a physical connection

Can be used over a large area to determine if anything is in the ground and more precise locating is required.



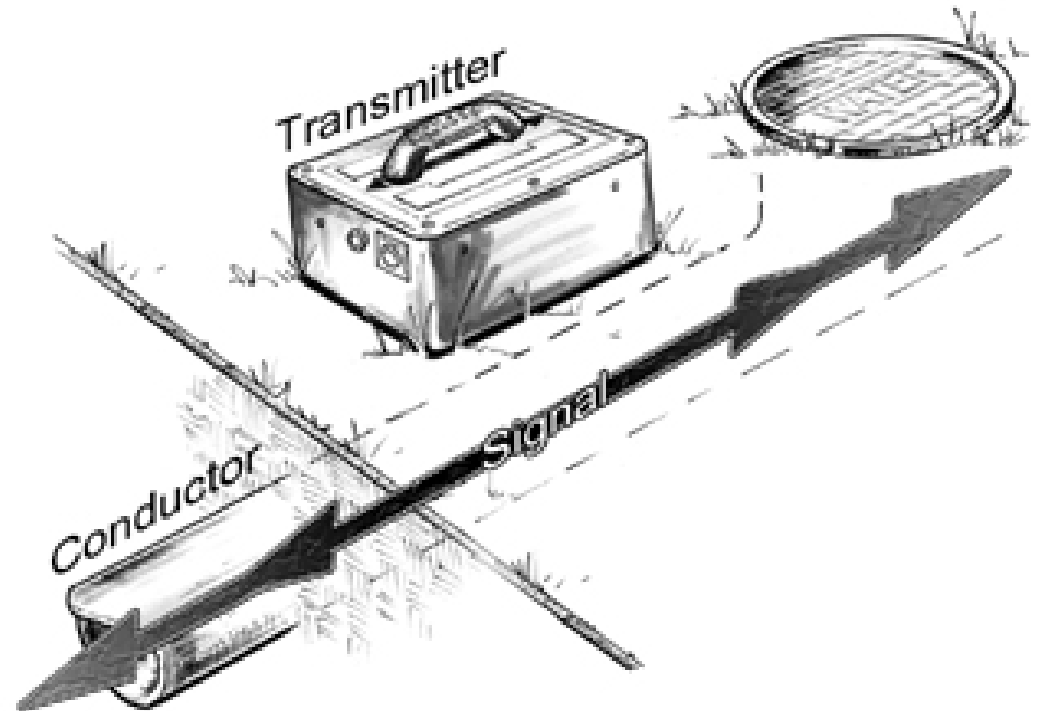


# Electromagnetic Locating

- Induction

Has significant limitations concerning depth and distance

Has the potential to energize all conductors underground, limiting usefulness of locate

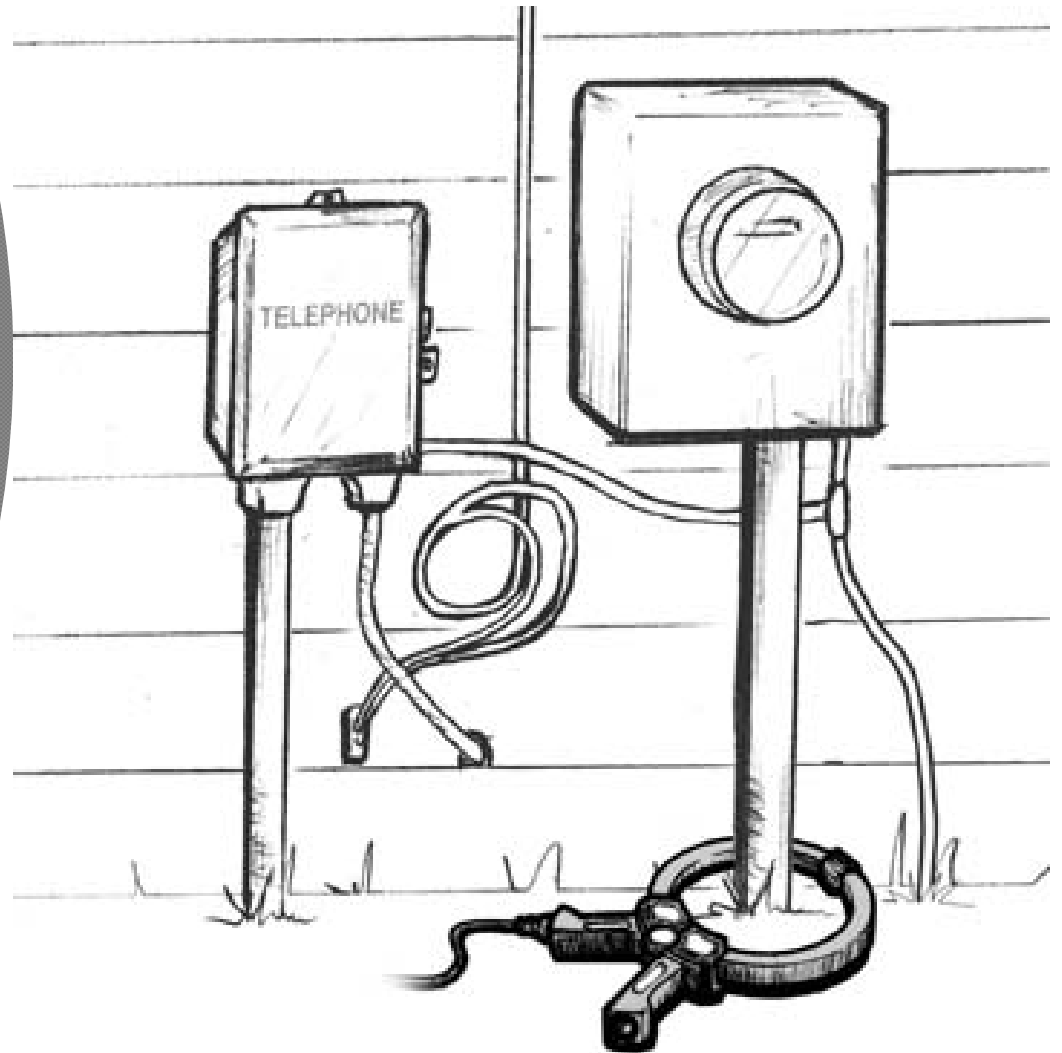


# Electromagnetic Locating

- Induction with clamp

An effective way to energize a conductor without a physical connection

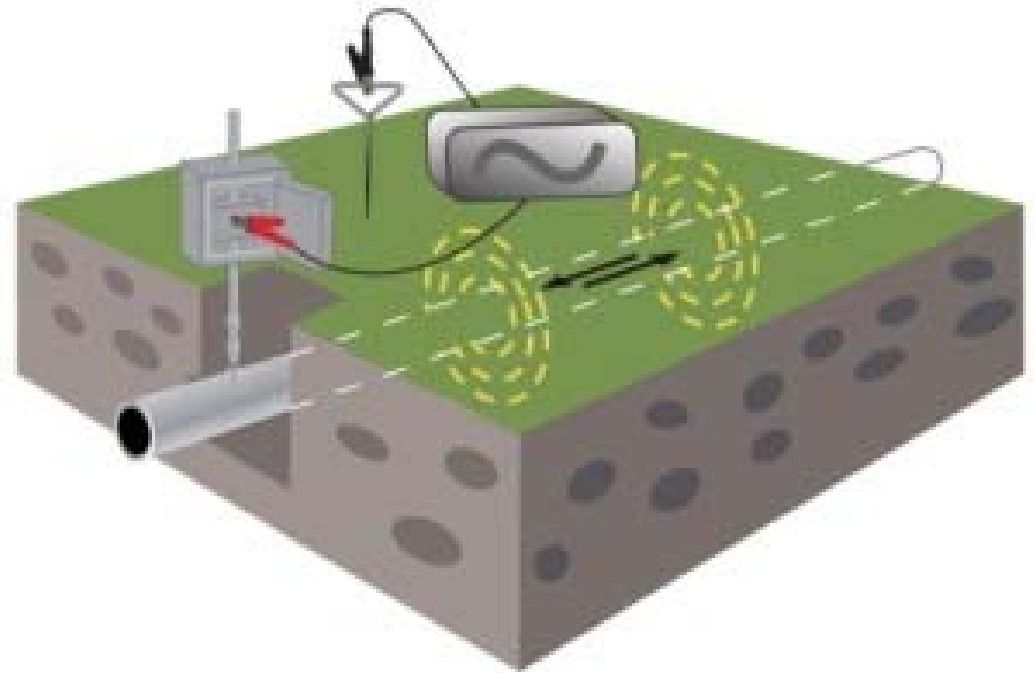
Much more likely to isolate the desired conductor  
(Less bleeding of signal)



# Electromagnetic Locating

- Direct connection

AC voltage from the transmitter is connected directly to the pipe or cable at an access point such as a valve, meter or end of the conductor, and the circuit is completed by a connection to a stake or other ground connection point



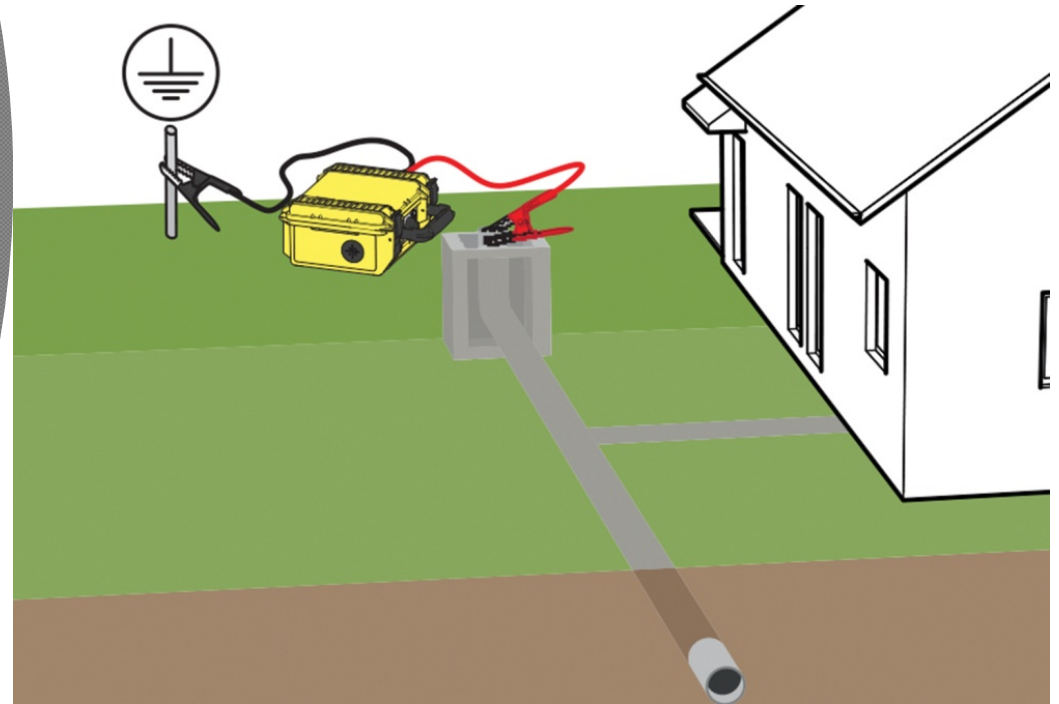
# Electromagnetic Locating

- Direct connection

Signal is strong and detectable over a long distance

Conductor isolation is more reliable.

Insulated pipe joints reduce or inhibit signal

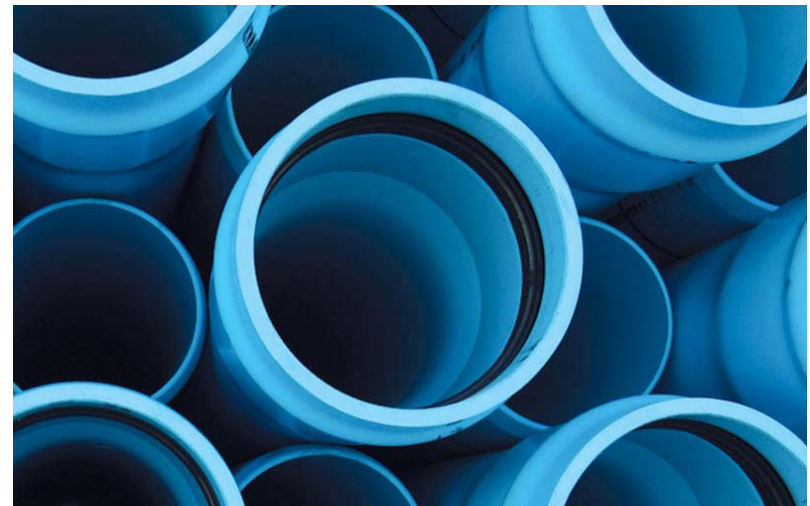




# Electromagnetic Locating

- Non metallic pipe

Cannot be traced  
electromagnetically  
without help



# Electromagnetic Locating

- Non metallic pipe

Use tracing wire laid next to the pipe



# Electromagnetic Locating

- Non metallic pipe

Use metallic drain rod with  
a clamp or direct  
connection



# Electromagnetic Locating

- Non metallic pipe

Use equipment with a sonde





# Questions

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