THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of detecting and locating a fluid leakage in a fluid pipeline network, the method comprising:

receiving output data, from a plurality of water meters and/or sensors in an area of the pipeline network, relating to acoustic or vibration measurements as measured by sensors associated with a part of the pipeline network proximate said sensors,

transforming any time domain output data to data in a frequency domain, wherein the transformed output data in the frequency domain is separated into discrete frequency bins each containing a range of frequency values, and a peak magnitude value associated with each frequency bin is recorded,

determining a leakage condition by comparing, within a predetermined frequency range, the peak magnitude values of the transformed output data in the frequency domain with a predetermined threshold value for a corresponding frequency bins,

computing a sum value of the peak magnitude values within a predetermined frequency range of the transformed output data in the frequency domain and associating said sum value of the peak magnitude values with a corresponding sensor, and

locating a source of the fluid leakage by identifying one or more sensor(s) in the area of the pipeline network that is closest to the source of the fluid leakage based on comparing said sum values of the peak magnitude values associated with said plurality of sensors in the area of the pipeline network over a period of time.

2. The method of claim 1, wherein locating a source of the fluid leakages further comprises identifying at least two sensors of the plurality of sensors in the area of the pipeline network that is closest to the source of the fluid leakage based on comparing said sum values associated with said plurality of sensors in the area of the pipeline network over a period of time, and estimate a location of the source of the fluid leakage based on (1) a relative geographical pipeline distance between the identified sensors, (2) configuration of pipelines between the identified sensors, and (3) the identified sensors' respective sum values.

3. A method of claim 1 or claim 2, wherein locating a source of the fluid leakage

comprises comparing said sum values of said plurality of sensors against a predetermined sum threshold value of about 250 to about 300.

4. A method of any one of the preceding claims, wherein each of said sum values of said plurality of sensors is adjusted by a predetermined material sensitivity multiplier calibrated to the material of the corresponding pipeline in the network.

5. A method of any one of the preceding claims, wherein each of said sum values of said plurality of sensors is adjusted by a predetermined pressure sensitivity multiplier calibrated to accord with a fluid pressure of the corresponding pipeline in the network.

6. A method of any one of the preceding claims, wherein each of said sum values of said plurality of sensors is adjusted by a predetermined flow sensitivity multiplier calibrated to accord with a fluid flow type of the corresponding pipeline in the network.

7. A method of any one of the preceding claims, wherein each of said sum values of said plurality of sensors is adjusted by a predetermined soil condition sensitivity multiplier calibrated to accord to a soil condition of the area of the pipeline network.

8. A method of any one of the preceding claims, wherein locating a source of the fluid leakage further comprises determining whether said acoustic or vibration measurement output data was collected during a period of rainfall in the area of the pipeline network and, if so, adjusting the predetermined threshold value when comparing measured frequency values of any output data collected during the period of rainfall.

9. The method of claim 8, wherein determination of the period of rainfall is based on (1) comparing the measured frequency values and/or the sum values of said plurality of sensors across a plurality of sensors in the area of the pipeline network against a baseline threshold value and outputting a difference value for each sensor, (2) comparing said difference value for each sensor over consecutive days, and (3) weather forecast data of the area at the time the output data was measured.

10. A method of any one of the preceding claims, further comprising determining the magnitude of fluid leakage based on said sum values of said plurality of sensors in the area.

11. The method of claim 10 when dependent on any one of claims 4 to 7, wherein determining the magnitude of fluid leakage further comprises adjusting said sum values of said plurality of sensors in the area with any one or more of the sensitivity multipliers.

12. A method of any one of the preceding claims , wherein frequency values of the transformed output data in frequency domain is separated into 256 discrete frequency bins.

13. A method of any one of the preceding claims, wherein the predetermined frequency range is between zero and 1,200 Hz.

14. The method of claim 13, wherein the predetermined frequency range is between 350 Hz and 1,000 Hz.

15. The method of claim 14, wherein the predetermined threshold value for determining the leakage condition is about 60.

16. A method of claim 3 or claim 15, wherein the predetermined threshold value and/or the predetermined sum threshold value is calibrated for each of the plurality of sensors based on baseline non-leakage measurements of each sensor at predetermined measurement times to account for traffic and ambient noise of a pipeline network in the area proximal to the respective sensor.

17. A method of any one of the preceding claims, wherein each of said sensors is configured to take acoustic or vibration measurements associated with a part of the pipeline network proximate said sensor at spaced intervals during a predetermined time period.

18. A method of any one of the preceding claims, wherein locating a source of the fluid leakage further comprises (1) obtaining water usage readings from the water meter during the step of recording the acoustic or vibration measurement output data from said sensors to

determine water usage, and (2) discarding any acoustic or vibration measurement output data collected from said sensor during a period of water usage.

19. A server operatively configured to detect and locate a fluid leakage in a fluid pipeline network, the server comprising a processor having instructions stored thereon that when executed by the processor, causes the processor to perform a method according to any one of claims 1 to 18.

20. A system for detecting and locating a fluid leakage in a fluid pipeline network, the system comprising:

a plurality of water meters installed in an area of the pipeline network,

a sensor connected to each of the plurality of water meters, each sensor being configured to output data relating to an acoustic or vibration measurement associated with a part of the pipeline network proximate said sensor,

wherein the water meter and/or the sensor is configured to record the acoustic or vibration measurement output data, transform the output data from a time domain to a frequency domain, and send the output data to a remote server, the remote server being a server of claim 19.