CLAIMS

1. An apparatus comprising:

a first power rail configured to be held at a first voltage;

a second power rail configured to be held at a second voltage;

a load power rail;

multiple power-multiplexer tiles coupled in series in a chained arrangement and configured to jointly perform a power-multiplexing operation responsive to a power-rail switching signal, each power multiplexer tile configured to switch between coupling the load power rail to the first power rail and coupling the load power rail to the second power rail; and

power-multiplexer control circuitry coupled to the first power rail and the second power rail, the power-multiplexer control circuitry including:

a comparator configured to produce a relative voltage signal based on the first voltage and the second voltage, the power-multiplexer control circuitry configured to generate the power-rail switching signal based on the relative voltage signal; and

inter-tile signal propagation circuitry that couples the multiple power-multiplexer tiles in series and is configured to propagate the power-rail switching signal between consecutive power-multiplexer tiles along the chained arrangement.

2. The apparatus of claim 1, further comprising:

a circuit load coupled to the load power rail,

wherein the power-multiplexer control circuitry is configured to overlap the coupling of the load power rail to the first power rail and the coupling of the load power rail to the second power rail to continuously provide power to the circuit load via at least one of the first power rail or the second power rail during the power-multiplexing operation.

3. The apparatus of claim 2, wherein the circuit load is configured to receive a periodic clock signal and to continue active operation based on the periodic clock signal during the power-multiplexing operation.

4. The apparatus of claim 1, further comprising:

a processor;

a modem; and

a display screen operably coupled to at least one of the processor or the modem, wherein

at least one of the processor or the modem is coupled to the load power rail to receive power; and

the processor and the modem are configured to cause the display screen to display visual-related data responsive to a communication decoded by the modem.

5. The apparatus of claim 1, wherein:

the comparator is configured to compare the first voltage to the second voltage; and

the relative voltage signal is indicative of whether the first power rail or the second power rail has a higher voltage level.

6. The apparatus of claim 1, wherein the comparator comprises an analog comparator including a hysteresis filter configured to filter out high frequency voltage noise on at least one of the first power rail or the second power rail.

7. The apparatus of claim 1, wherein the power-multiplexer control circuitry includes power-multiplexer initiation circuitry configured to receive a voltage-level indication signal from a voltage controller and to generate the power-rail switching signal based on the voltage-level indication signal.

8. The apparatus of claim 7, wherein the voltage-level indication signal is indicative of the voltage controller issuing a command to change a second voltage level of the second voltage on the second power rail.

9. The apparatus of claim 8, wherein the voltage-level indication signal is indicative that the voltage controller is issuing the command to increase the second voltage level of the second voltage on the second power rail so as to be higher than a first voltage level of the first voltage on the first power rail.

10. The apparatus of claim 7, wherein:

the power-multiplexer initiation circuitry includes power-multiplexer triggering circuitry configured to generate at least one trigger signal based on the relative voltage signal from the comparator and the voltage-level indication signal from the voltage controller; and

the power-multiplexer initiation circuitry is configured to generate the power-rail switching signal based on the at least one trigger signal.

11. The apparatus of claim 10, wherein the at least one trigger signal is indicative that the second voltage is greater than the first voltage based on a voltage measurement made by the comparator and a command issued by the voltage controller.

12. The apparatus of claim 10, wherein the power-multiplexer initiation circuitry includes digital hysteresis circuitry configured to receive the at least one trigger signal and to delay forwarding of the at least one trigger signal until the at least one trigger signal has a constant logical value for a delay period.

13. The apparatus of claim 1, wherein a power-multiplexer tile of the multiple power-multiplexer tiles includes:

a first switching circuit coupled between the first power rail and the load power rail, the first switching circuit configured to disconnect the load power rail from the first power rail or to connect the load power rail to the first power rail responsive to the power-rail switching signal; and

a second switching circuit coupled between the second power rail and the load power rail, the second switching circuit configured to disconnect the load power rail from the second power rail or to connect the load power rail to the second power rail responsive to the power-rail switching signal.

14. The apparatus of claim 13, wherein:

the first switching circuit includes a first transistor coupled between the first power rail and the load power rail, the first transistor configured to be turned on or off responsive to the power-rail switching signal; and

the second switching circuit includes a second transistor coupled between the second power rail and the load power rail, the second transistor configured to be turned on or off responsive to the power-rail switching signal.

15. The apparatus of claim 13, wherein:

the first switching circuit includes a first big switch and a first little switch coupled between the first power rail and the load power rail;

the second switching circuit includes a second big switch and a second little switch coupled between the second power rail and the load power rail; and

the multiple power-multiplexer tiles are configured to function as a distributed power switch during a power-up sequence for a circuit load coupled to the load power rail by closing little switches in a first pass along the chained arrangement and closing big switches in a second pass along the chained arrangement.

16. An integrated circuit comprising:

a first power rail configured to be held at a first voltage;

a second power rail configured to be held at a second voltage;

a load power rail;

a circuit load coupled to the load power rail;

multiple power-multiplexer tiles coupled in series in a chained arrangement and configured to jointly perform a power-multiplexing operation responsive to a power-rail switching signal, each power multiplexer tile configured to switch between coupling the load power rail to the first power rail and coupling the load power rail to the second power rail; and

power-multiplexer control circuitry coupled to the first power rail and the second power rail, the power-multiplexer control circuitry including:

comparison means for producing a relative voltage signal based on the first voltage and the second voltage;

initiation means for generating the power-rail switching signal based on the relative voltage signal; and

signaling means for propagating the power-rail switching signal from one power-multiplexer tile of the multiple power-multiplexer tiles to a consecutive power-

multiplexer tile along the chained arrangement such that the power multiplexing operation is performed sequentially along the chained arrangement.

17. The integrated circuit of claim 16, wherein the

signaling means is distributed at least one of within or between individual ones of the multiple power-multiplexer tiles.

18. The integrated circuit of claim 16, wherein the power-multiplexer control circuitry includes tile control means for causing each power-multiplexer tile of the multiple power-multiplexer tiles to disconnect the load power rail from the first power rail and to connect the load power rail to the second power rail in one sequential pass along the chained arrangement, the tile control means distributed with each power-multiplexer tile of the multiple power-multiplexer tiles.

19. The integrated circuit of claim 16, wherein:

the initiation means includes triggering means for generating at least one trigger signal based on the relative voltage signal and a voltage-level indication signal; and

the initiation means is configured to generate the power-rail switching signal based on the at least one trigger signal.

20. The integrated circuit of claim 19, wherein the power-multiplexer control circuitry is configured to provide the power-rail switching signal to the multiple power-multiplexer tiles to initiate the power-multiplexing operation responsive to a second voltage level of the second voltage crossing a first voltage level of the first voltage while the second voltage is changing such that the multiple power-multiplexer tiles can perform the power-multiplexing operation while the second voltage level is substantially similar to the first voltage level.

21. The integrated circuit of claim 19, further comprising:

voltage control means for controlling multiple on-chip voltages, the voltage control means configured to provide the voltage-level indication signal responsive to issuing a command to change the second voltage on the second power rail.

22. A method for power multiplexing with an active load, the method comprising:

supplying power to a load power rail using a first power rail;

comparing a first voltage of the first power rail to a second voltage of a second power rail;

generating a relative voltage signal based on the comparing;

obtaining a voltage-level indication signal indicative of an issuance of a command to change the second voltage of the second power rail;

generating a power-rail switching signal based on the relative voltage signal and the voltage-level indication signal;

performing a power-multiplexing operation, including:

propagating the power-rail switching signal along a chained arrangement of multiple power-multiplexer tiles; and

at each power multiplexer tile,

disconnecting the load power rail from the first power rail responsive to receiving the power-rail switching signal; and

connecting the load power rail to the second power rail responsive to the receiving of the power-rail switching signal; and

supplying power to the load power rail using the second power rail.

23. The method of claim 22, wherein the generating the power-rail switching signal comprises:

determining that the relative voltage signal is indicative that the second voltage is greater than the first voltage; and

determining that the voltage-level indication signal is indicative of the issuance of the command to increase the second voltage above the first voltage.

24. The method of claim 22, further comprising filtering out noise that affects the first voltage or the second voltage.

25. The method of claim 22, further comprising during the performing of the power-multiplexing operation:

providing an oscillating clock signal to a circuit load coupled to the load power rail; and

continuing active operation of the circuit load responsive to the oscillating clock signal.

26. The method of claim 22, wherein the propagating of the power-rail switching signal along the chained arrangement of the multiple power-multiplexer tiles comprises:

propagating at least one trigger signal or at least one switch enable signal along the chained arrangement of the multiple power-multiplexer tiles.

27. The method of claim 22, wherein the disconnecting and the connecting are performed in a single sequential pass along the chained arrangement of the multiple power-multiplexer tiles.

28. An apparatus comprising:

a first power rail configured to be held at a first voltage;

a second power rail configured to be held at a second voltage;

a load power rail;

multiple power-multiplexer tiles coupled between the first power rail and the load power rail and between the second power rail and the load power rail, the multiple power-multiplexer tiles configured to switch between coupling the load power rail to the first power rail and coupling the load power rail to the second power rail based on a power-rail switching signal; and

power-multiplexer control circuitry coupled to the first power rail and the second power rail and configured to generate the power-rail switching signal based on at least one trigger signal, the power-multiplexer control circuitry including:

power-multiplexer triggering circuitry configured to generate the at least one trigger signal responsive to a second voltage level of the second voltage crossing a first voltage level of the first voltage,

a power-multiplexer tile of the multiple power-multiplexer tiles including:

at least one switching circuit coupled between the load power rail and both the first and second power rails; and

tile control circuitry configured to:

receive an incoming power-rail switching signal from a preceding power-multiplexer tile;

cause the at least one switching circuit to disconnect the load power rail from the first power rail responsive to receipt of the incoming power-rail switching signal;

cause the at least one switching circuit to connect the load power rail to the second power rail responsive to the receipt of the incoming power-rail switching signal; and

forward an outgoing power-rail switching signal to a succeeding power-multiplexer tile.

29. The apparatus of claim 28, further comprising:

a voltage controller configured to provide a voltage-level indication signal indicative of an issuance of a command to change the second voltage level of the second voltage on the second power rail, wherein

the power-multiplexer control circuitry includes a comparator configured to produce a relative voltage signal based on a comparison of the second voltage level to the first voltage level; and

the power-multiplexer triggering circuitry is configured to detect that the second voltage level crosses the first voltage level based on the voltage-level indication signal and the relative voltage signal.

30. The apparatus of claim 28, wherein:

the at least one switching circuit includes:

a first switching circuit coupled between the first power rail and the load power rail;

a second switching circuit coupled between the second power rail and the load power rail; and

the tile control circuitry is configured to:

cause the first switching circuit to disconnect the load power rail from the first power rail responsive to the receipt of the incoming power-rail switching signal; and

cause the second switching circuit to connect the load power rail to the second power rail responsive to the receipt of the incoming power-rail switching signal.