The term "Network Performance" covers a wide range of possible situations, with such differing promises and difficulties that it is difficult to make generalizations. Instead, I'll talk about the specific possibilities and limitations of possible specific approaches. The following three examples of possible networked artistic encounters don't cover all the territory but at least serve as examples:

In scenario number one, two or more concert halls schedule a simultaneous event, each with its own local audience and performers. Each concert hall arranges to project images and sound from the remote performers; their images show up on one or more screens arranged behind the local performers, so that the audience sees one or more remote stages as well as the local one, all from more or less the usual viewing angle. This is often more expensive than simply bringing the remote performers to the local performance spaces, each in turn, would be, because the additional complexities in the setup are likely to outweigh the travel costs they offset. On the positive side, since it's costing a fortune anyway, it might be worth it to pay for an upgraded network connection that can guarantee a low latency of communication. Another problem is the geometry of the situation, since the local and remote performers can't easily make eye contact (although at least each can be given a video monitor showing the other from the audience's perspective). Finally, if more than three time zones separate locales in which there will be an audience, it can get very difficult to schedule an appropriate time to hold the performance.

In scenario number two, a concert (or any other event) takes place in a single location, real or not. But the audience, or at least some of it, is "telepresent", getting video and audio feeds from the event, and perhaps can also send information back to the event. This is a good way to save money and fuel (most of which is usually spent getting the audience to the show). Latency is not much of an issue (since we could probably tolerate a few tenths of a second of delay in audience feedback, so we can just let the audience hear everything a fraction of a second late and nobody will be the wiser). On the other hand, there's no way to monitor what quality of sound and picture the remote audience hears and sees over their home systems. Also, members of the audience don't hear and feel each other's presence except indirectly; the psychology of the audience as a group is missing.

Yet a third scenario uses networking only for experimentation and rehearsal, presumably in preparation for one or more old-fashioned physical performances afterward, for which the musicians will have to travel to get to a fixed locale. Here, since we're likely to try to contain costs for a rehearsal in a way we might not for a performance, we will probably not end up with access to special low-latency networking infrastructures (that will always be boutique stuff), and so latencies will be noticeable and may sometimes change capriciously. On the positive side, we gain tremendous flexibility in scheduling, since the performers can presumably work from locations close to wherever they happen to be. Time zone differences are less problematic than in Scenario one, since there are only performers to deal with, and performers are more able to operate at strange hours than audiences are.

These examples show that there are wide differences in artistic and practical needs from one networked music performance to another. No one way of doing it will satisfy everyone's needs; and careful thought will always be needed in designing a networked encounter for any specific situation.

My own early experiences with networked performances were very much in the first mold above: performers in different sites interacting with each other in front of local audiences. In the years 1997-1999, Rand Steiger, Vibeke Sorensen, Mark Danks and I formed a group we called Global Visual Music. We did a series of performances involving music improvisation and live computer graphics images, one of which was networked between two sites (Miller Theater in New York, and Intel headquarters outside Portland, Oregon; the performers were Steven Schick, Anthony Davis, Vanessa Tomlinson, and Scott Walton).

We quickly decided that instead of doing "telepresence" (which had already been well explored by that date), we would try to do something that actually explored the idea of the physical distance between the sites. Instead of sending sounds and images across the network, we opted to send real-time audio analyses of the instruments and for each of the four instruments to create, on the other side, a possibly variable 'ghost' for the instrument. In the case of the pianos, we used MIDI interfaces that could either be used to play each other's physical piano remotely or to play synthetic sounds. For the percussion we did an instrument-by-instrument analysis (this is the genesis of Pd's bonk~ object) and
could direct each percussion setup to samplers and/or totally different sound generators on the other side.

In keeping with this, we connected the audio and computer graphics scenes in the same way, so that different audio sources could correspond via their analyses to movements in the graphical realm, either locally and/or remotely. Because the relationships between local and remote instruments, and between sound and graphics, were constantly shifting, the perceived presence of the remote performers was enigmatic rather than didactic. Each of the two audiences got a different show; at each locale, the 'here' and 'not-here' were treated as essentially different perceptible presences.

When not approached carefully, “telepresent” performance is aesthetically dangerous ground. If you see someone on a screen, does that mean the person is really thousands of miles away, or just in a nearby closet? Our own group enjoyed a cruel spoof at the hands of the Convolution Brothers at the 1997 ICMC; they did a “telepresent” performance except that, after a few minutes, the 'remote' performer was smoked out from behind a side curtain.

In general, when we watch someone on a screen who is in another place, we are in a familiar situation: we're watching TV. Watching TV is a fine thing (saves fuel) but it's not something you want to “aestheticize”. More generally, “telepresent” performance almost inevitably has the side effect of calling attention to the technology (the TV screen) and this awareness prevents us from achieving the level of receptivity that music (and other performing arts) should ideally invite in the viewer.

Having seen a lot of networked performances of one sort or another, I find myself most excited by the potential of networked “telepresence” as an aid to rehearsal, not performance. We are likely soon to see times in which information travels much, much more cheaply than humans. Good musicians can learn to plan rehearsals in such a way that 50 or 100 milliseconds of round-trip latency don't stop them from exchanging ideas (and leaving the fine tuning of timing for the couple of meetings they might get when physically together for an actual show). Rehearsing musicians can face each other, even when there are more than two locales if the geometry is carefully thought out, and visual cues are much more latency-tolerant than sound cues. Finally, the economics of networked rehearsal promise to encourage bolder experimentation with or by performers, since they can interact economically over a longer span of time than might be possible physically, given the hyperactive schedules we all now enjoy. It would be good on at least some days to just do it all from home.