HETEROGENEITY AND TRANSPARENCY IN NETWORK MUSIC

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Abstract

The use of computer networks for sharing music resources can be difficult due to heterogeneity of resources to be shared. This work provides an insight into the heterogeneity of resources for the specific case of computer music and proposes simplify the connection of heterogeneous resources in a transparent way and with different levels of granularity.

Network Music Resource

Figure 1: Two kinds of resources may be provided on the network: Physical and Logical Resources.

Resources Heterogeneity

Once a resource is provided to the network, the network capability will influence the resource availability:

1. Network bandwidth limits scalability.
2. Transmission speed *versus* sound latency, delay and synchronicity.
3. Signal quality *versus* network bandwidth.

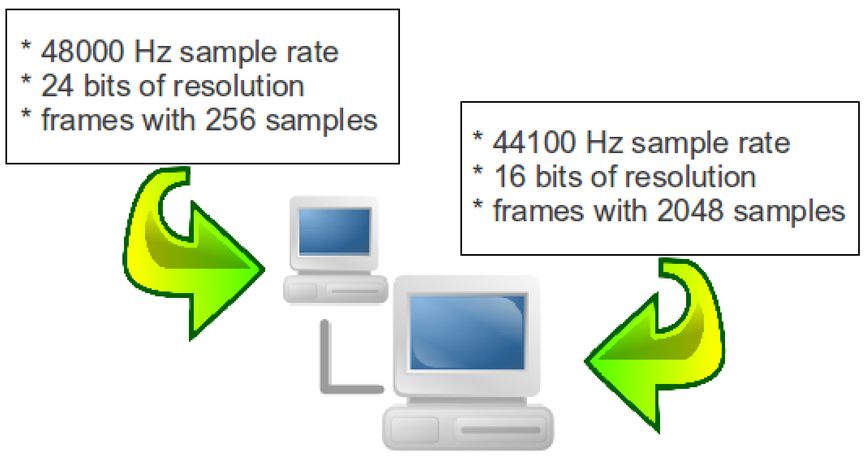

Figure 2: Different nodes may have different resource configurations on the same network. This heterogeneity is caused by hardware / software configuration.

The same resource can be provided to fit different scenarios [2] :

1. Monitoring should be faster but may have low quality;
2. Recording can be slower but must have high quality;
3. Public audience (P.A.) may accept larger delay and lower quality.

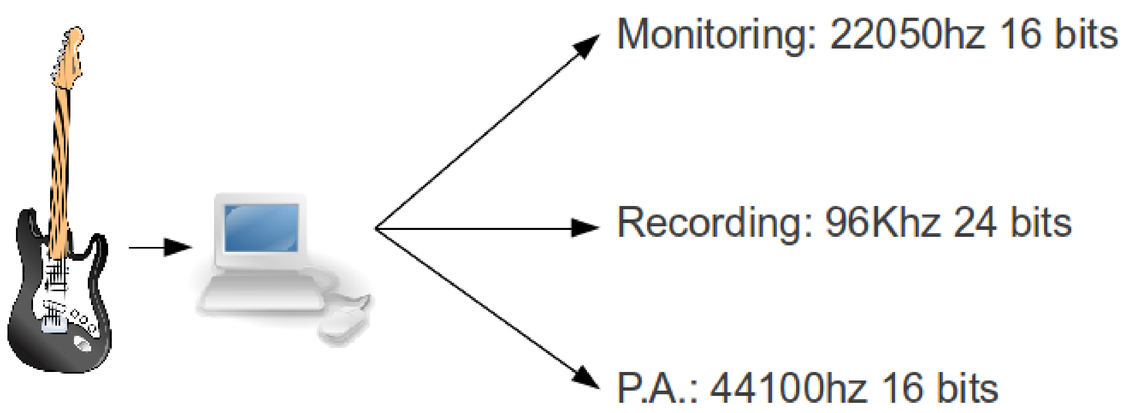

Figure 3: Different activities allows different resource configuration.

Different network protocols can be used to achieve better quality and/or faster transmission:

1. RTP [4]
2. RTSP [8]
3. SCTP [5]
4. TCP [6]
5. UDP [9]

Other possible heterogeneity is the use of **audio codecs** to compress audio data. Compression can increase the number of audio channels but can decrease signal quality [1].

Resource Transparency

1. Each source node publishes how its resource is provided;
2. Each source node starts serving its resource without modification;
3. Each sink node adapts each remote resource to its local settings.

Resource Location transparency

Each node publishes its name and network address together with its resource list. This brings location transparency allowing the establishment of connections through the use of human readable names instead of IP addresses and ports [3].

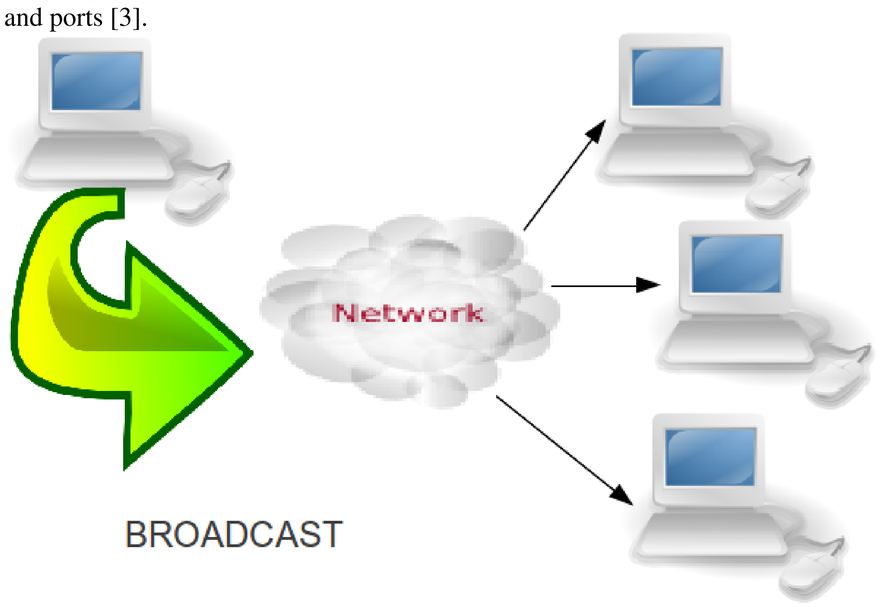

Figure 4: Broadcast message to LAN when a new node is added or a new resource is added to a node.

LAN may be useful for:

1. performances
2. practicing
3. study
4. recording

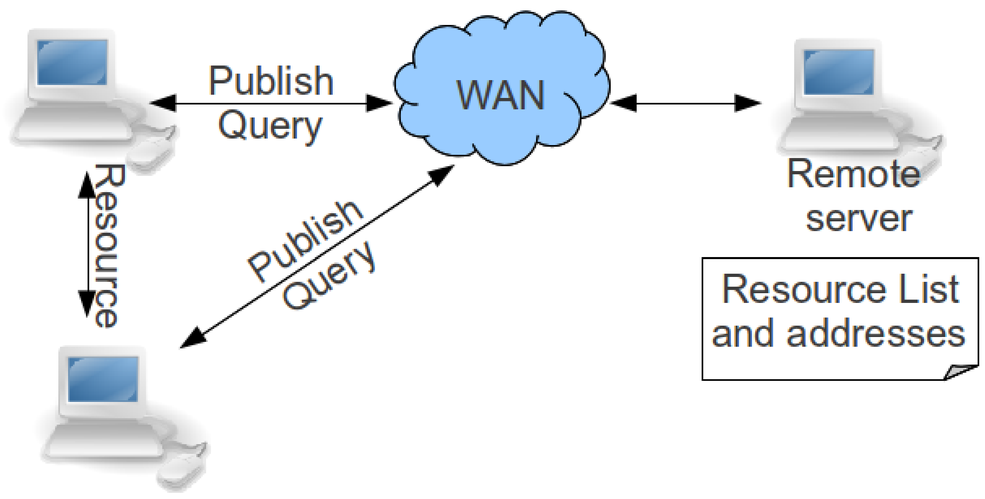

Figure 5: Resource Connection in Peer-to-Peer with centralized server that publishes resources.

Conclusion

- Resource heterogeneity may be used to tune network connections depending on the use of resource.
- Heterogeneity may bring up configuration issues that may represent a problem for sharing audio through network.
- The accompanying paper presented some network solutions to implement heterogeneity with transparency features to network music configuration.

Future Works

- Implementation of these ideas into Medusa [7];
- Measure of latency in data conversion;
- Measure latency and packet loss with different network protocols.

Acknowledgements

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