Overview of Legislature's Proposed Audio Streaming Project

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Project Cost Summary Audio Streaming from 13 Committee Rooms	Year One	Years Two and Ongoing
One Time Foundation and Per Room Costs • Hardware and Software • Telecomm • Professional Services: audio system programming, "kill switch", and simple KLISS integration	$ **77,410**	-
Annual Ongoing Costs • Hardware/Software Maintenance • Telecomm • Content Distribution Subscription • Operations and Support	$ **40,390**	$ **40,390**
Total Costs per Year	$ **117,800**	$ **40,390**

Overview of Legislature's Proposed Audio Streaming Project

A Few Comments on 03 March Meeting of House Appropriations Committee

How are the Committee rooms "wired" and are they wired to do audio streaming?

During the 03 March meeting members heard various remarks regarding the lack of "wiring" in the Capitol building and that there was a budget for this wiring in the Capitol Restoration Project.

The Capitol building was rewired and new network switches were installed for broadband during the various phases of the Capitol Restoration Project. This work was driven by the Legislature's 2004 strategic plan that also defined the need for updated applications, e.g., KLISS. Note: Broadband is a wide bandwidth data transmission with an ability to simultaneously transport multiple signals and traffic types. The medium can be coaxial cable, optical fiber, radio or twisted pair.

Nearly all of the wiring throughout the Capitol building, making up the Capitol's "local area network", is Category 6 cable, commonly referred to as Cat6, a standardized twisted pair cable for Gigabit Ethernet (speeds of up to 1 gigabit per second in standard configurations and up to 10 gigabits per second in advanced set ups). While some of the network switches, installed during the early phases of the Capitol Restoration Project, are nearing end-of-life, the Capitol's "wiring" is capable of handling data, voice, and streaming traffic.

As part of the Capitol's local area network, each Committee room has multiple "data jacks" at member and staff seats which are connected to a data switch housed in the nearest telecommunications closet. Connecting your computing devices to these data jacks enables connections to the local computing environment (Capitol Data Center) or the internet. Each Committee room also has microphones and ceiling speakers connected to an audio system housed in the same telecommunications closet.

What is required to stream audio from a Committee room and what about "free" audio streaming ?

During the 03 March meeting members heard various remarks regarding what is required to do audio streaming from Committee rooms and the potential for using "free" audio streaming sites.

The steps required to do audio streaming effectively from a Committee room include:

1. Tap into the existing audio system in the t/c closet and capture the analog audio stream.
2. Convert the analog stream to a digital audio stream using an encoder in the t/c closet.
3. Send digital stream to application server in the Capitol Data Center via the local area network.
4. Send digital audio stream to a content distribution service (CDN, Content Distribution Network).
5. The CDN enables users access the digital audio stream via a specific web address.

Regarding "free" audio streaming sites, it goes without saying that "free" is usually not.
The primary downsides of free sites include:

-- the lack of capability to serve hundreds of concurrent users,
-- no service level commitments,
-- the lack of ability to provide statistics regarding # of users accessing site, duration of session, etc. ,
-- the gauntlet of advertising presented to users wanting to access the streams, and
-- the inability of the sites to archive and provide ongoing access to the archived audio streams.

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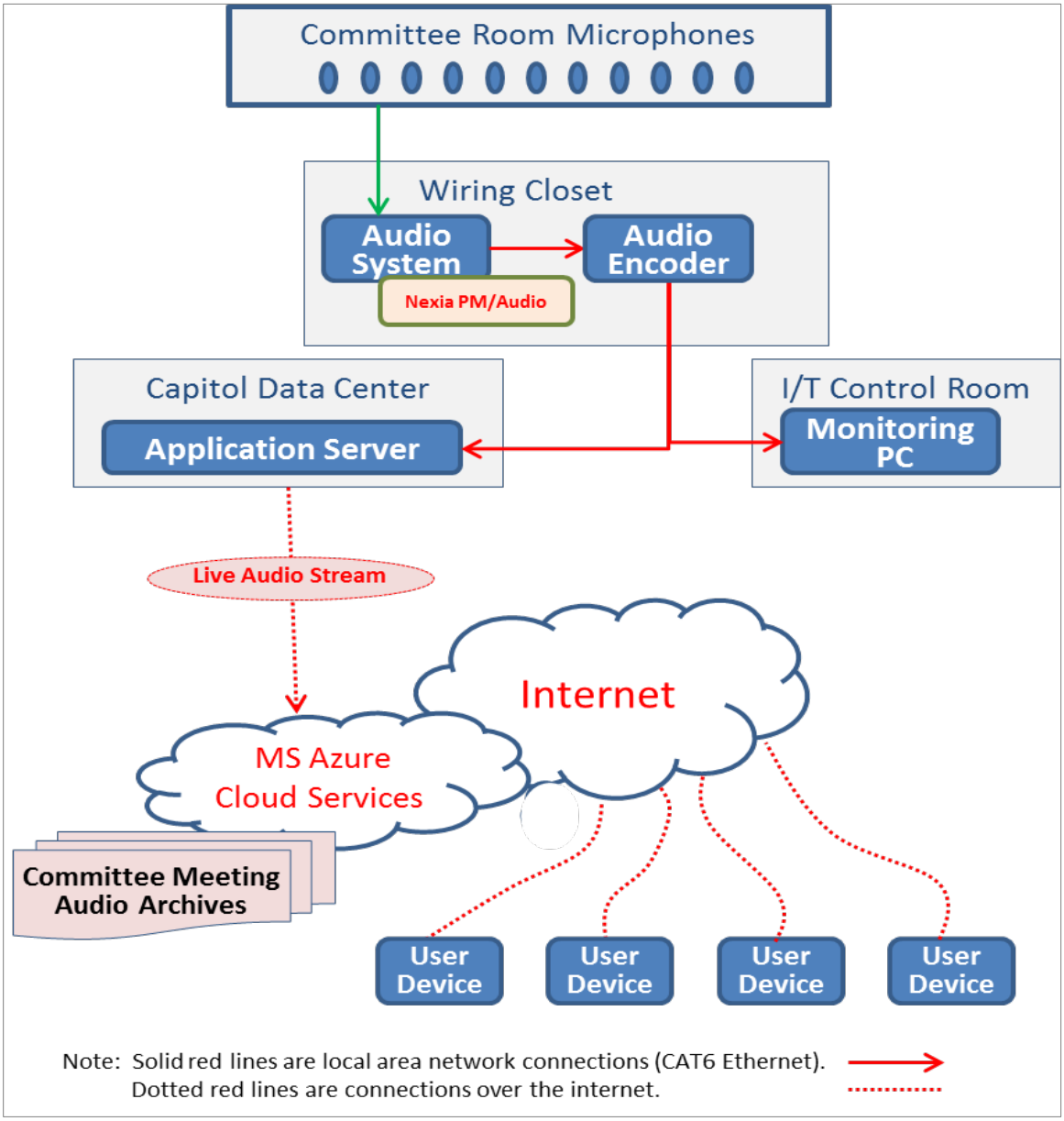
Basic Architecture of Proposed Audio Streaming Environment



1) KS Committee Room Audio System captures analog audio signal from mics in room and reproduces and amplifies these signals for broadcast through the room's ceiling-mounted speakers.
2) The Nexia PM (a digital signal processor) is installed in the audio system and packages the signal output for transmission. These packaged signals are sent to the audio encoder by way of the Ethernet cable (CAT6).
3) The audio encoder converts the analog audio signals to digital audio signals and routes the signals to an application server in the Capitol Data Center by way of the Capitol's local area network (Ethernet cable CAT6).
4) The Capitol Data Center application server takes the digital signals from the local area network and routes them to a specific external IP address, the destination data center of the content distribution service, by way of the internet.
5) A server in the content distribution service's data center, a Microsoft Azure environment, accepts the digital signals from the internet and then enables user access to the audio stream at a specific IP address. The content distribution service is set up to provide access to a high number of concurrent users with web-enabled devices from anywhere on the internet.

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Cost Component Matrix	One Time	Ongoing
Foundation	Upfront Costs	Annual Costs
Per Room	Upfront Cost x number of rooms	Annual Costs x number of rooms
	Total One Time Costs	Total Annual Costs

Cost Component Matrix	One Time	Ongoing	
Foundation	$ 19,300	$ 90	
Per Room	$ 4,470 x 13 rooms	$ 3,100 x 13 rooms	
	$ 77,410	$ 40,390	Year 1 Cost = $ 117,800 Year 2 Cost = $ 40,390 Pilot Two Year Cost = $ 158,190 Pilot Five Year Cost = $ 279,360

Cost Component		Timing of Cost
Foundation	One Time	Up Front, During Implementation
Foundation	Annual Maintenance	Annually, Year 1 and Ongoing Years
Foundation	Ongoing Operations	Annually, Year 1 and Ongoing Years
Per Room	One Time	Up Front, During Implementation
Per Room	Annual Maintenance	Annually, Year 1 and Ongoing Years
Per Room	Ongoing Operations	Annually, Year 1 and Ongoing Years

Cost Component		Includes
Foundation	One Time	-- Equipment required to operate audio streaming from a given number of rooms within the Capitol, e.g., web servers, PCs and displays for monitoring streaming. -- Professional Services assistance necessary to develop software-based kill switch (simple start/stop audio streaming) and simple integration within KLISS.
Foundation	Annual Maintenance	-- Vendor charges for maintenance and support on the software and hardware listed in one time foundation costs.
Foundation	Ongoing Operations	-- Cost of subscription to web streaming service (e.g., Amazon or other CDN – content distribution network or Sliq or Granicus subscriptions). -- Cost of staff to support and monitor audio streaming system *(thought here is to use one of TC's staff as the subject-matter-expert re audio streaming and hire a temporary Session contractor if necessary to backfill that individual's duties during the Session. Operation assumption for now is that streaming audio only doesn't require frequent monitoring and can be completed with existing staff.)*
Per Room	One Time	-- Equipment required to capture audio, integrate with existing audio systems, and distribute audio, e.g., encoder, Nexia PM/Audio, and virtual server. -- Initial wiring of all equipment and activation/testing of data services. -- Professional Services assistance necessary to install, configure, and test audio streaming capabilities and develop software-based kill switch (simple start/stop audio streaming) and simple integration within the KLISS environment.
Per Room	Annual Maintenance	-- Vendor charges for maintenance and support on the software and hardware listed in one time per room costs.
Per Room	Ongoing Operations	-- Port charges for data telecommunications services from each room.

Notes: What Is Included In The Streaming Project

Included in the proposed project are the following capabilities and features:

A) **Internet-accessible audio streaming of meetings in thirteen Committee rooms.**
Thirteen Committee Rooms will be outfitted with the ability to stream the audio portion of meetings. These audio streams will be accessible from the internet.

Note: Room #14, The Old Supreme Courtroom, Room 346-E, will have the capability to stream audio – this is being implemented as part of a proof-of-concept pilot project utilizing Sliq Media's system.

B) **Utilize existing audio systems in the thirteen Committee rooms.**
This audio streaming capability will utilize the existing audio systems in those thirteen rooms with the addition of an audio system card, encoder, and telecomm connections routed through the appropriate wiring closets.

C) **Monitoring, measuring, and reporting on usage of real time streaming and archived content.**
Any vendor selected to provide audio streaming services must have the ability to monitor, measure, and report on usage, i.e., how many visits to each meeting, length of stay/connection for each visit to a meeting, number of visits and duration of access to archived meetings, etc...

D) **Audio streaming "as is" from the existing Committee room audio systems.**
With video streaming one of the requirements is to utilize a protocol where the streamed camera image "follows" the "active mic" which requires some level of process change management and training of Committee members and staff. With audio-only streaming there is no requirement for process change as the audio stream will reflect the actual conversation received by the audio system (including those situations where multiple speakers are talking into their active mics concurrently).

E) **Kill switch.**
This audio streaming project will include software-based kill switch functionality. In the event that the chair wants to terminate the streaming of audio from the meeting, someone (likely a staff member) will need to access a secured software application and input instructions to end audio streaming for that meeting.

F) **Accessible archiving of audio files.**
Either of the two likely vendors for this effort will provide the ability to archive the audio streams from our committee meetings and enable access to those audio files via the internet. These audio archives will be "simple" recordings of the meetings and will not provide indexing or tagging of content within the files. These contents of these files will not be transcribed (see note below).

G) **Simple/basic integration with KLISS and the Committee System module.**
Links embedded within KLISS homepage and relevant Committee System pages and possibly Committee meeting calendar.

Notes: What Is Not Included In The Streaming Project

Not included in the proposed pilot project are the following capabilities and features:

Note: the associated cost impact estimates (designated as low, moderate, high, or extremely high) are informed guesses as to the overall cost impact of implementing and operating each incremental capability)

1) **Transcription of audio files or closed captioning of live audio stream:**
Cost impact = extremely high.

The act of archiving audio files creates some risk that we will need to provide access to these files by those with hearing challenges based upon requirements in the federal ADA law (Note: most states currently archiving audio or video of meetings are not currently providing transcription services). Providing accurate transcriptions of the speech content of Committee meeting files is very costly and proved to be the factor that shelved the video streaming project the last time when it was evaluated in the 2008 – 2009 timeframe.

2) **Real time or archived tagging/indexing of content:**
Cost impact = high.

Tagging/indexing of content enables specific pieces of audio content to be "labeled" in real time or for look up purposes in archived files, e.g., for example, content associated with a particular speaker would be tagged or indexed so that the speakers name could appear in a text box during a real time event or that name could be searched and located when reviewing an archived file.

3) **Full integration with KLISS:**
Cost impact = moderate to high.

Full integration of streaming audio with the KLISS application drives along two vectors:

1) One vector provides existing KLISS content that is relevant to a particular Committee meeting to be easily accessed from an active "working screen" – this content is accessible via links and multiple windows. Target content might include Committee-related bills, amendments, schedules, minutes and testimony from earlier meetings, etc.
2) The second vector would provide the ability to relate specific audio content to a meeting date, speaker, subject, or any other relevant metadata element and enable access to this audio content "on demand". To do this would require that we index archived audio files and also dedicate ongoing people resources to the effort of tagging/indexing content as described in the "does not include" item above.

Foundation Cost Estimates

(Note: Estimates assume we are implementing a system to stream audio captured from the existing audio systems in each of thirteen Committee Rooms.)

Foundation Cost Components			

One-Time Foundation Costs:	**cost/unit $**	**units**	**total $**
Virtual Application Server	900	1	900
Control station pc and monitor	1,000	1	1,000
Develop software-based Kill Switch	5,000	1	5,000
Develop simple/basic integration with KLISS	10,000	1	10,000
Sub-Total One-Time Costs			**16,900**
Project Contingency ~15%			2,400
Total One-Time Costs			**19,300**

Ongoing Foundation Costs per Year:	**cost/unit $ annually**	**units**	**total $/room annually**
Annual Ongoing Hardware/Software Maintenance			
Virtual Application Server	90	1	90
Sub-Total Annual Ongoing Hardware/Software			**90**
Annual Ongoing Operational Costs			
Technical Support/Monitoring (contractor – 5m) [1]	0	1	0
CDN functionality (content distribution network)[2]	0	1	0
Sub-Total Annual Ongoing Operational Costs			**0**
Total Annual Ongoing Maintenance & Operational Costs			**19,390**

Year 1 Foundation Cost	**19,390**
Cost of Foundation in Year 2 and Ongoing Years (Maintenance/Operations)	**90**
Two-Year Total Cost of System Foundation Components	**19,480**
Five Year Total Cost of System Foundation Components	**19,750**

[1] Cost of Session contractor to backfill for TC staff member = 5m x 20d/m x 6h/d = 600h; 600h x $30/h = 18,000. This position is necessary for video streaming. Audio streaming only can be operated with existing staff.

[2] The costs related to the encoder, the on-premise administrative server, and CDN services are included in the operational cost-per-room line item labeled "Sliq Streaming Services and Support Subscription"

Per Room Cost Estimates

(Note: Estimates assume we are implementing a system to stream audio captured from the existing audio systems in each of thirteen Committee Rooms.)

Per Room Cost Components

One-Time Costs per Room	**cost/unit $**	**units**	**total $**
Encoder	2,000	9	18,000
Nexia PM/Audio	1,500	13	19,500
Professional Services	1,000	13	13,000
Total One-Time Costs			**50,500**
Project Contingency ~15%			7,575
Total One-Time Costs per Room for 13 Rooms			**58,075**
Total One-Time Costs per Room			**4,470**

Ongoing Costs per Room per Year:	**cost/unit $ annually**	**# of units per room**	**total $/room annually**
Annual Ongoing Hardware/Software Maintenance			
Nexia PM/Audio	150	13	1,950
Sub-Total Annual Ongoing Hardware/Software Maintenance			**1,950**
Annual Ongoing Operational Costs			
Telecom	550	13	7,150
Sliq Streaming Services and Support Subscription[3]	2,400	13	31,200
Sub-Total Annual Ongoing Operational Costs			**38,350**
Total Annual Ongoing Maintenance & Operational Costs per Year for 13 Rooms			**40,300**
Total Annual Ongoing Maintenance & Operational Costs per Room per Year			**3,100**

Year 1 Cost Per Room	**7,570**
Cost per Room in Year 2 and ongoing (Maintenance and Operations)	**3,100**
Two Year Total Cost Per Room	**10,670**
Five Year Total Cost Per Room	**19,970**

[3] The costs related to the audio encoder are based on 9 encoders for 13 rooms. Each encoder is multi-channel and there is one encoder per wiring closet. The CDN services are included in the operational cost-per-room line item labeled "Sliq Streaming Services and Support Subscription"

Sliq Technologies

Sliq Technologies has modified their business model to a subscription service. Hardware, software, Microsoft Azure U.S.-based cloud services, and support are included in the subscription cost. The monthly subscription fee is $200 per audio venue.

Solution: Live and Archived Streaming – 13 committee rooms	Units	Upfront	Monthly	Extended Upfront	Extended Monthly
Streaming monthly fee	13	$0.00	$200.00	$0.00	$2,600.00
Encoder with Sliq Controller	9	$2,000.00	0.00	$18,000.00	0.00
Harmony Hub On-Premise Administrative Server	1	0.00	0.00	0.00	0.00
Harmony Cloud Services (Utilizing Microsoft U.S.-based Azure cloud services)	1	0.00	0.00	0.00	0.00
Setup/Training	1	0.00	$0.00	0.00	$0.00
TOTAL		**$2,000.00**	**$200.00**	**$18,000.00**	**$2,600.00**

Costs of Using Sliq Tech Solution		
	Sliq Technologies One Time Costs	18,000
	Sliq Technologies Annual Subscription Fees	31,200
	Total Year 1 Cost	49,200
	Total Year 2 Cost	31,200
	Sliq Technologies Cost for Two-Year Subscription	80,400

Granicus

The Granicus solution quoted March, 2014, remains valid. Granicus regularly offers discounts on monthly fees that can be negotiated during the contract process.

Solution: Live and Archived Streaming – 4 committee rooms 2 year pilot	Units	Upfront	Monthly	Extended Upfront	Extended Monthly
Open Platform	1	$0.00	$100.00	$0.00	$100.00
Government Transparency Suite	1	$0.00	$300.00	$0.00	$300.00
Granicus Encoding Appliance	13	$4,475.00	$100.00	$58,175.00	$1,300.00
Performance Accelerator	1	$875.00	$400.00	$875.00	$400.00
Shipping	13	$1,625.00	$0.00	$21,125.00	$0.00
TOTAL		**$6,975.00**	**$900.00**	**$80,175.00**	**$2,100.00**

Costs of Using Granicus Solution		
	Granicus One Time Costs	80,175
	Granicus Annual Maintenance	25,200
	Total Year 1 Cost	105,375
	Total Year 2 Cost	25,200
	Granicus Cost for Two-Year Subscription	130,575