

# The Cisco Approach to Telehealth

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**A viewpoint from the Cisco Industry Solutions Group**

# Table of Contents

- 1. OVERVIEW ..... 3**
  - 1.1. TELEHEALTH TRENDS AND STATISTICS ..... 4
  - 1.2. VERSIONS OF TELEHEALTH ..... 4
  - 1.3. TERMINOLOGY ..... 4
  
- 2. DEFINING YOUR OPERATING AND FINANCIAL STRATEGY ..... 5**
  - 2.1. DEFINE YOUR BUSINESS SCENARIOS AND USE CASES ..... 5
  - 2.2. UNDERSTAND AND BUILD THE FINANCIAL MODEL (INCLUDING REIMBURSEMENT) ..... 6
  - 2.3. IDENTIFY THE BUSINESS OUTCOMES AND VALUE METRICS ..... 7
  - 2.4. PHYSICIAN AND CLINICIAN LICENSURE ..... 8
  
- 3. PLAN YOUR DEPLOYMENTS ..... 9**
  - 3.1. ORGANIZATIONAL NEEDS ..... 9
  - 3.2. DEFINING A DESIRED WORKFLOW ..... 10
  - 3.3. TECHNICAL REQUIREMENTS ..... 12
  - 3.4. DEFINING A PROJECT CHAMPION ..... 13
  - 3.5. TRAINING REQUIREMENTS ..... 14
  
- 4. ARCHITECTURE COMPONENTS ..... 15**
  - 4.1. CISCO'S APPROACH TO TELEHEALTH ARCHITECTURE ..... 15
  - 4.2. CORE NETWORK ..... 16
  - 4.3. CISCO COLLABORATION FOUNDATIONAL INFRASTRUCTURE ..... 17
  - 4.4. CHOOSING AN ENDPOINT ..... 17
  - 4.5. WORKFLOW SOFTWARE ..... 20

## 1. Overview

Telehealth is a key initiative for healthcare organizations today. The Cisco Industry Solutions Group (ISG) consults with customers across multiple services lines including Neurology, Behavior Health, Cardiology, Dermatology, post-procedure follow-up, acute care, home care, evaluation and management, and patient outreach just to name a few. ISG finds several reasons for why organizations are looking to deploy a system including:

- reducing costs
- improving patient services
- supporting patient engagement and self-management
- addressing a new competitive landscape
- avoiding hospital readmissions and associated Medicare reimbursement penalties
- providing improved access to specialists
- educating patients
- expanding the geographic footprint of the organization

These use cases and deployment reasons are far from a complete list but should serve as an example as to how broad the telehealth conversation can be and shows the vast number of use cases that can be addressed.

When engaging with customers, Cisco often finds that they are in a current state of limited deployment in a small handful of areas across the organization and that they typically lack a unifying strategy or architecture to be able to accommodate a telehealth deployment at scale. These limited or siloed deployments were often a result of direct purchases made by the individual department and often the purchases were completely or partially funded by a grant. In these situations, it is often found that the systems lack technical and workflow interoperability with other video systems, are costly to expand, or do not have the flexibility to use multiple different endpoints to deliver that video session to the end user. Very few customers have what could be called a scaled deployment that is effectively staffed, deployed, marketed, has a high utilization rate, or could even resell its telehealth services to other organizations.

This is where Cisco can be a trusted advisor with customers by helping them to establish a vision and architecture strategy for deploying a telehealth program at scale. This starts with defining the needs of the organization and then once those needs are defined a unifying architecture approach can be developed that addresses the use cases that are identified today and also is flexible enough to handle the needs of tomorrow. This is all done through building an architecture foundation where one can add on the individual endpoints and software to fulfill a particular use case and do that cost effectively as well as have the security required for a healthcare architecture that is involved in transmitting Patient Health Information (PHI). This unified approach also provides interoperability and helps to reduce the IT support and administrative overhead of managing multiple disparate systems. Lastly, the system is nothing if it does not deliver a value to the business, and thus defining and measuring the value is paramount to a successful deployment.

This white paper is intended to provide an overview of Cisco's approach to telehealth deployments and provide high-level guidance. It is intended for an audience that has a broad understanding of Cisco's communications architecture and technology.

## 1.1. Telehealth Trends and Statistics

It seems that any consulting company report that you read predicts an explosion of electronic visits. The common theme across all studies is that with looming physician shortages, as well as increased and changing patient expectations for service, telehealth will continue to grow significantly. Cisco also sees a large driver for telehealth with shifts in reimbursement dynamics moving from volume to value based reimbursement which has created a greater sense of urgency to reduce costs and maximize operational efficiency. Telehealth programs provide a great way to achieve both of those goals simultaneously.

## 1.2. Versions of Telehealth

While the term telehealth is used in this paper there are several emerging terms for the same concept such as:

- e-health, e-visits
- connected health
- telemedicine
- virtual health

Additionally, when you look at the technology involved or versions of telehealth, you have voice, chat, video, email, mobile applications, and geo-tagged devices. The visits can also be asynchronous -- patient data and information is captured and exchanged between the patient and provider but it is not done as part of a real time consultation; or synchronous -- is essentially a real-time exchange of information.

This paper is strictly focused on synchronous telehealth sessions primarily involving video but also possibly including voice or chat. While other technologies and systems may be part of an architecture strategy and thus need to be included in the planning, those other technologies and systems are too numerous to be able to cover in this white paper.

## 1.3. Terminology

The following terms are used this paper:

- Care Provider – Any employee or affiliate of the healthcare organization that will be involved in delivering the services in the telehealth session. This could be any role but common ones are a physician specialist, general practice physician, physician assistant/nurse practitioner, behavior health specialist, or a translator.
- Clinical Leader – Person in a leadership role of a particular service line. Typically a manager, director, or senior physician. This person will typically also be in a decision-making capacity about the technology or how it is used.
- Scheduling Agent – Person that is responsible for manually determining availability and scheduling the providers and/or patients required for a telehealth consultation.
- Patient – Any individual receiving care from a Care Provider.
- Telehealth – A remote engagement and exchange of information between a patient and a provider using some sort of technology.

## 2. Defining Your Operating and Financial Strategy

At the start of any telehealth initiative, one must first define what issues you are trying to solve, situations you are looking to address, and outcomes you are looking to achieve. As noted in the overview section, the business situations and desired outcomes for a telehealth deployment are as vast as the topic is broad. This section of the document will go over the model that Cisco follows to guide our customers when consulting with them on a strategy. The first step is to understand the overall strategic imperatives that a telehealth program will address. For example, is the overall corporate strategy to expand access to care, to expand into different markets with new offerings and partners, or to target specific cost savings across the organization?

A **Chronic Care Model** is a strategy that targets specific populations (having a common disease-state, e.g., diabetes) that heavily consumes high cost services. Example care models will include mobile and home care, outreach programs, patient-centered medical homes, pharmacy management, centers of excellence, and specialty clinics in hospital settings.

A **Primary Care Support Model** is a strategy that primarily targets expanding access to care. This approach leverages the significant investment in resources and expertise of the entire health system, especially if that health system owns many assets as part of an overall continuum of care. Some examples include retail clinic support, urgent care clinic support, diagnostic imaging centers, complementary medicine, specialty hospitals or units, and centers of excellence.

A **Wellness or Prevention Model** is a strategy that starts with the revenue and cost models at the forefront. This would be appropriate for a Payer, ACO, or Health System managing populations in a value-based reimbursement scenario. The goal may be to demonstrate cost savings for a patient population, while also closely managing the revenue and cost for the provider organization. For example, a provider organization may wish to establish outreach programs in partnership with a Payer, partner with large self-funded employers to offer remote care for employees from a campus based health center, or target industries with remote locations where travel is difficult and costly.

The model selected likely results from the goals and objectives of the organization. Is the overriding objective to manage costs and increase efficiency, or is it to build a new revenue stream? Determining the strategic objectives and the supporting model or models will go a long way towards helping the organization define the appropriate success metrics later.

### 2.1. Define Your Business Scenarios and Use Cases

Once the overall strategy and objectives are defined, the functional areas within the organization will refine the specific scenarios. For example: Acute Care eVisits, Stroke (emergency, or pre & post procedure), Dermatology, Behavioral Health, Pharmacy, Specialist Consults, Patient Education, Staff Education, Grand Rounds, or Language & Interpretative Services.

There are many detailed use cases that fall within each of these scenarios that will require analysis and planning for new business processes and workflows for clinicians as well as patients. Many organizations rely on a telehealth steering committee to formalize and prioritize the preliminary use cases. Steering committee members may include executive leaders, clinical leaders and service line directors, as well as representatives from legal, IT, finance and risk/compliance.

## 2.2. Understand and Build the Financial Model (including Reimbursement)

In most cases finances are the key consideration of the organizations' imperatives and telehealth programs and therefore it is important to be able to measure results. In the exercise of defining business scenarios and use cases, the organization will identify specific desired business outcomes. Most of those business outcomes will have some sort of financial consideration tied to them.

The old adage holds true – “You don’t always get what you want – but you most often get what you measure!”

To ensure this is achieved, you need to identify the measurements that contribute to the business objectives and imperatives associated with the program. If you are targeting one of the operating and financial strategic models described above, show how you will measure desired strategic contributions (e.g., physician productivity, reduced costs, increased access, increased revenue, attraction of new patients, etc.). Other examples include increased patient satisfaction, customer retention and loyalty, or overall population management success.

If you are targeting a cost savings model, show the key metrics and benchmarks that you are improving. For example, this could be reduced travel costs, reduced training costs, or reduced staff overtime. If this is a revenue growth initiative, define the ways telehealth can drive additional revenue or new patients into the organization.

### 2.2.1 Insurance Reimbursement for Telehealth Services

Telehealth reimbursement is a very complex topic, varies by state, and going into detail on the topic is beyond the scope of this whitepaper. At a high level in the fee-for-service (FFS) model there are three payer categories: Medicare, Medicaid, and Commercial Insurance from private payers. Examples of Private Payers include Blue Cross Blue Shield Plans, Aetna, Cigna, Humana, and United Healthcare to name a few. These organizations serve both individual policy-holders and employer groups. When employer groups are large, they often self-fund their benefit plans to their employees, and they use Private Payers to help them administer these benefit plans.

Reimbursement rules for Medicare involve, among other things, the site where the service is originated from, the type of service offered, and rural health professional shortage areas (HPSAs). A good rural health fact sheet from CMS can be found at <http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/telehealthsrvcfsht.pdf>. Also CTel has a very good reference page at <http://ctel.org/expertise/reimbursement/>. These are among many sites and resources available to get more information on telehealth reimbursement policies.

Reimbursement for Medicaid varies state by state. Again the CTel site is a fantastic resource for state specific laws <http://ctel.org/expertise/reimbursement>. A breakdown of state telemedicine legislation tracking can also be found from ATA at <http://www.americantelemed.org/policy-page/state-policy-resource-center>.

Lastly, in the reimbursement realm there are Private Payers. In this area not only will there be variance from payer to payer, but also from individual hospital contract to contract. Private Payers set their own reimbursement policies as it relates to telehealth services, however, they carefully track and observe what federal and state programs do and typically follow suit.

It should be noted that in healthcare there is a gradual shift from “volume-based payment” (fee-for-service models) to “value-based payment,” which may include pay-for-performance, bundled payments, or capitation.

In these models, reimbursement for an individual telehealth session is not as much of a factor as having a telehealth program that helps manage the care of the patient via a high-quality and cost-effective solution.

One last form of reimbursement includes out-of-pocket direct, or cash, payment by the patient. With the increase of high deductible insurance plans the industry is seeing an increased number of instances where patients are paying much closer attention to the cost of care they are about to receive and balancing that with quality, ease of scheduling, and convenience of the visit. This new choice paradigm for consumers is often called the “retailization of healthcare.”

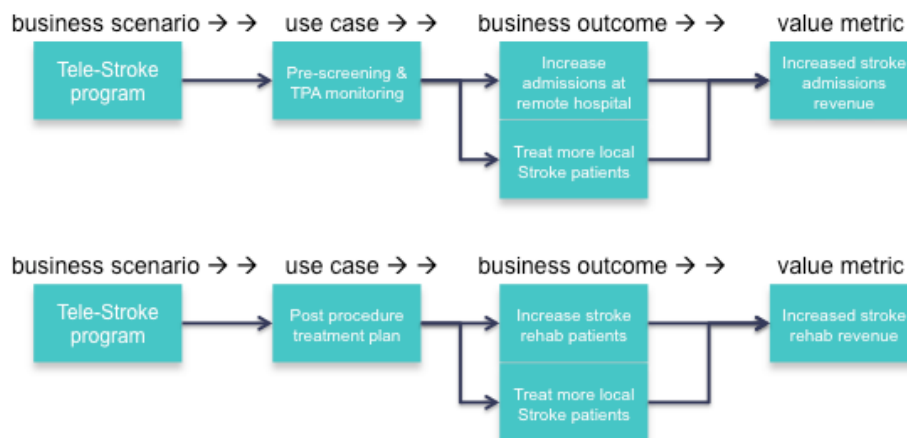
### 2.2.2 Productivity

Monetary reimbursement should not be the only consideration when looking to deploy a telehealth program. There can also be a strong case for productivity enhancement for employed physicians, and thus with increased productivity can come increased revenue from greater patient throughput and/or increased job satisfaction on behalf of the employed physician. This productivity increase most often comes from the reduction in travel time to see a patient or a more efficient schedule due to shorter duration telehealth visits. If a physician is traveling one hour, one way to a remote clinic in order to see a select few patients that ends up being two hours of unbilled and nonproductive travel time that could be eliminated with a telehealth deployment.

### 2.3. Identify the Business Outcomes and Value Metrics

Once the financial model and reimbursement details have been understood, the next step is to identify the desired business outcomes and their associated value metrics. This process starts by defining the relationship map between the business scenario, the detailed use case being addressed, the desired business outcome, and finally the metric used to identify the value associated with the flow.

In the example below, an organization is planning to implement a Telestroke program that links a stroke specialist at their main (“hub”) hospital and the emergency team at their remote (“spoke”) hospital. They are looking to achieve two specific business outcomes: increased admissions of stroke patients at the remote hospital and increased follow-up rehabilitation of those patients using specialists at the “hub” hospital. The financial or value measurements are tied to increased revenue and utilization of staff for the stroke treatment program at the remote “spoke” hospital.



## 2.4. Physician and Clinician Licensure

Like reimbursement, the full scope of state medical licensure is a complex topic that is outside the scope of this document. It is brought up here as it is a common issue and question raised. As the laws stand right now, a provider must be licensed in the state where the patient is located and treated. While there are a few exceptions, this ends up being a major barrier for delivering telehealth services across state lines but may be resolved at a later date via currently pending federal legislation. It is advisable to consult your legal team as early in the telehealth planning process as possible to ensure all licensure requirements are being appropriately addressed.



## 3. Plan Your Deployments

At the start of any design one must first define the issues you are trying to solve for, use cases you are looking to address, and outcomes you are looking to achieve. Once the use cases and desired outcomes for a telehealth deployment have been defined, the task of prioritizing the deployments is the next logical step. This section of the document will go over the approach that Cisco follows to guide our customers when working with them on an implementation and deployment. While not a complete list, the most common areas, questions, and information to be gathered includes:

- Define the functional needs within each organization affected
- Define the desired changes needed within the workflows and processes
- Define and understand the technical requirements
- Identify and define roles for Project Champions
- Identify and define training requirements

The most common service lines that Cisco sees our customers looking to address are (in no order of importance):

- Telestroke consultation,
- Other Neurology consults,
- Primary Care eVisit (sore throat, flu, etc.),
- Cardiology pre- and post-procedure consultation,
- Dermatology,
- Behavioral Health,
- Patient Education/Video Coaching,
- Physician and Nursing Education/Video Coaching
- TelePharmacy,
- Specialist Access/Consultations to Remote/Rural Facilities,
- Grand Rounds Simulcast,
- Interpretative Services,
- Patient Triage done through a Contact Center.

### 3.1. Organizational Needs

The first step to any deployment is defining what the project is intended to achieve. While this may seem like an obvious statement, Cisco often finds that there are mistakes or items overlooked in this critical first step.

One common approach that limits program options for the organization and prevents the scalability and interoperability of a telehealth program is when a deployed solution is designed for a single use case, instead of designing a solution for the organization that will accommodate multiple use cases at scale. In a common scenario, a clinical leader might approach IT discussing a use case they want to address. This is often accompanied by a technical solution that they recently saw at a trade show or read about in an industry publication. In a rush to accommodate the clinical leader, the solution is purchased and deployed without a vision into how it fits into an overall telehealth or remote medicine strategy. In hindsight, this often results in redesign at a later date, as the system is not interoperable with other technologies, is costlier to maintain, does not scale to other uses cases, and/or does not provide an integrated workflow across the care continuum.

Cisco believes this is a prime area for IT-focused resources to be able to show value and be involved in driving a strategic vision and interoperable, scalable solution for the organization. The recommended step here is to maintain an active presence on the steering committee and contact other clinical leadership, hospital executive

leadership, and other stakeholders in the organization to gather their requirements, desires, and initiatives. The exact individuals to engage here will vary from organization to organization with no right or wrong person(s), but the take-away will be to gather a current comprehensive list of organizational goals that can inform the system design.



**Gather telehealth requirements across the organization rather than a single department, clinical leader, or service line.**

When requirements are gathered it is not only the use case that the original department or leader is looking to address or the overall goals they want to achieve, but also the details around the desired workflow, provider requirements, and other user requirements. Guidance for these other requirements is detailed in the sections to follow.

### 3.2. Defining a Desired Workflow

A successful deployment of any solution involves unison of People, Process, and Technology. Defining the desired workflow of a telehealth deployment is the Process part of that trio. As is a recurring theme in this white paper, there is no true right or wrong workflow process. In the deployments that Cisco has been involved in, we have seen that every organization has a slight tweak on a process because it works for their users. Those processes can range from a completely software driven model where an automated system is conducting tasks like provider availability, call routing, billing, EHR integration, and so on to a system where pagers are still used to contact the specialist and the same core workflow process is followed with the face-to-face visit is replaced with a video visit. The only real mistake is to have a process that is vastly different than existing non-telehealth workflows resulting in a cumbersome, time consuming system that is not used and/or not trusted by its stakeholders.



**When determining the workflow, understand the existing non-telehealth workflows and try to replicate these as much as possible while still improving ease of use and automation.**

Regardless of whether the workflow will be completely automated, completely manual, or somewhere in-between there are several key components to understand. It is not important at this stage to define the exact technology systems that will conduct the tasks; however, it is important to define the desired functionality. In fact, some may argue that it is even detrimental to brainstorming at this stage to confine ideas to just what a current deployed system is capable of.

- **Scheduling** – At a high level scheduling has two sides.
  - The first is the side of the care provider and at the core involves how the telehealth consultation will be worked into their other daily tasks and appointments. The first component is a system that can determine the availability of the provider, and the technology can range from a simple on-call coverage calendar to an automated scheduling system that is integrated with the provider's calendar in the EHR. The second component is how the provider will see that they have a telehealth consultation scheduled. For a workflow where the consultation occurs relatively immediately and the provider is paged with a request or is monitoring an active request queue, this is not applicable. However in most deployments the consultations are scheduled for a future date. In practice with these scheduled events Cisco has found that the best approach is to have a single schedule as the source of truth, preferably the calendar in the EHR, but there are other possibilities such as using a Microsoft Exchange supplemental calendar. Also, it should be discussed who will do the scheduling. Cisco most often finds that it ends up being the same people or department that conducts scheduling for in-person visits, but depending on the use case there may be other completely

integrated and automated systems integrated with the Cisco Contact Center that can determine skill based routing and availability.

- The other side of scheduling is the patient facing side. In some use cases, the patient may not be the one actively making the schedule request but instead someone on behalf of the patient initiates the request. One example of this is a nurse requesting a behavior health consultation for a patient in the ER. Again depending on the clinical area and use case there are many options here from viewing an existing electronic calendar, an integrated system to determine whom the specialist on-call is and routing the request to that specialist, or even having the patient be able to schedule an appointment themselves directly through a web patient portal or mobile application.
- **Reason for Visit** - How will the symptoms or reason for the visit be inputted and communicated to the care provider? From a workflow side, this can provide the benefit to the provider of knowing why the request is being made, so they can be prepared to handle the consultation. From a technology integration standpoint, as will be discussed in this paper, the reason for visit can be a factor in being able to automatically route and queue the request to the provider who can best handle the case.
- **Notification of Appointment Request** - In use cases where someone on the patient side will make a request for an appointment to be held at sometime in the future, how will a scheduling agent be aware that a request was made, so they can formally schedule the session? If there is an automated means of scheduling, how will the provider know that an appointment has been scheduled? Lastly does there need to be a final confirmation sent to the patient?
- **Queuing** - In certain use cases there can either be more than one request made at a time, or even when there is a single concurrent request, there may be a need to have the patient placed in a virtual “waiting room” while they wait for the care provider to join the session.
- **Medical Device Integration** - Will the use cases require the use of medical devices such as an otoscope or stethoscope? There are a limited number of telehealth use cases that require medical devices, but if they are required, there will be an important impact on the technical design. If medical devices are required other questions need to be addressed including:
  - Does the output of the medical device need to be transmitted across the video session?
  - Will the readings of the device need to be automatically or manually inserted in the EHR?
  - Are outputs, such as pictures, required to be permanently stored and part of the patient’s record?
- **EHR Integration** - The need to be able to accomplish EHR related tasks, like viewing the patient’s history and entering findings, is likely a given in most use cases of a telehealth deployment. When planning for the telehealth design requirements, it is key to know what type of integration will be used.
  - One type of integration is simply a standards based data exchange where an application from the telehealth vendor is used as the primary user interface and information transmitted to and from the EHR, likely through an HL7 or API interface.
  - The other type of integration is more of a technical integration of the video engine. In this integration type the EHR interface is still used by the provider and patient and the video session is launched directly from that EHR interface via a pre-configured button or link.
- **Billing** - Does the use case require the need to bill the patient directly through a portal? The most common area where Cisco sees this requirement is the eVisit Acute Care use cases where the patient is paying a deductible or per-visit flat fee. When one looks at the requirements for billing, how the payment will be processed is really the last step in the workflow requirements. If you want to implement payment before service, then you need to understand items including:
  - Is this patient and the type of request/need even eligible for an eVisit consultation?
  - What is the patient’s health insurance plan and does it cover the cost of the visit?

- Is this visit in part of a bundled payment for a procedure and thus payment has already been included as part of a larger bill?

If the desire is to have payment issued after services are delivered, similar to an inpatient model, then billing may be handled by the same processes and workflows, as those used for in-person visits. Note that this section just covers the topic of billing the patient. Reimbursement through various insurance plans is outside the scope of this document, but some additional detail is noted in the Understand and Build the Financial Model section of this document.

- **Pharmacy, lab, or other system integrations** – Do you need the ability to place lab orders, order prescriptions, or other CPOE tasks as part of their use cases? If so, will this be done directly through the EHR system, or will it require all orders be placed through the telehealth software and integrated with the EHR?
- **Specific Specialty Needs** – Are there specific workflows or functionality that is very specialized and required for that use case? A common example of this is in Telestroke where one may want a system that includes an assessment questionnaire to help determine if tPA should be administered. Most service line specific applications of telehealth will have unique specialty needs or workflows.
- **Home Monitoring Device Integration** – In the use cases where a care provider will be doing consultations to the patient in their home, will there be a need for home monitoring devices such as blood pressure, blood sugar, pulse oximeter, or scale? If these devices are required, you will need to determine where the data from these devices will be sent and stored and what integration, if any, is required with the EHR or telehealth software. There are many vendors in the home device space, and most often these devices upload and store the data to their private cloud where it is then available for the provider to reference during the consultation; however, this data is not directly sent to the EHR and rarely integrated into the telehealth software interface.
- **Individual's Location** – Where will the provider and patient be located? What are the mobility requirements for these respective individuals? Gathering this location information in the workflow will then be used as a major factor influencing the required equipment and overall back-end architecture components. The location both the provider and the patient will also be required for proper billing and reimbursement where applicable.



**Gather the requirements for how the targeted users will use the system and what functionality they will require to achieve their needs.**

### 3.3. Technical Requirements

In addition to workflow requirements that were highlighted above there are some additional possible requirements that are more technical in nature.

- **Voice, Chat, and Video** – Often when one thinks about telehealth they think in pure video terms. However, customers may think of telehealth in terms of chat or voice instead of, or in addition to, video. Voice or chat may also be a supplement to video and can be used before a video session is started or in the event that there is a problem with establishing a video session or the quality of the video session.
- **Skill-based Routing** – When a person makes a request for a telehealth session, how will that request be routed to the best-qualified and currently available person? This may start with a Reason of Visit request as noted in the workflow section where a person enters why they want the consultation. Based on that request, a manual or automated system is used to route the request. There may also be no additional skill-set routing required like in the case of a Telestroke where only the on-call neurologist is needed. However, even in this case availability routing is still needed to determine who that on-call person is and if they are available to take a consultation.

- **Notification of Waiting Patient** – In the event that queuing is used, how will the provider be notified that a patient is waiting for service? Commonly, Cisco will see a page sent or perhaps an automated phone call placed.
- **Patient Registration** – If the system will be used to conduct telehealth visits for patients that may not currently be members of the health system, how will new patients be registered? If it is an existing patient, do they need a user name/password to be able to access the portal or application that a visit will be conducted from?
- **Document Sharing** – Are there any needs for document sharing or co-browsing during the session?
- **Recording** – Is there a need to record the session? If recording will be used, is there a need for the patient to be able to access that recording at a later date? Where will these recordings be stored? What authentication mechanism will be used to control access to the recordings?
- **Endpoints** – Far more detail will be provided in Architecture Components section of this document but in general here one should think about the requirements for delivering video to the respective parties. Questions here include:
  - Will video sessions be made to parties outside the organization's secure network?
  - Is web browser integrated video required?
  - Is video required to be integrated into a mobile application on a table or smart phone?
  - What devices will the provider use and what are the mobility requirements for the provider?



**Gather the more non-workflow related technical requirements.**

### 3.4. Defining a Project Champion

In the telehealth deployments Cisco has witnessed that it is hard to find an example where the deployment was a success without strong project champions involved. This paper defines three champions: a Clinical Champion, IT Champion, and Telehealth Champion.

#### 3.4.1 Clinical Champion

In our view, the most important person is a Clinical Champion. This person is often a provider that is part of the service line where the system will be implemented, but that is not necessarily a requirement. This person should have a very strong understanding of the workflow and challenges that are part of that service line and must be someone that is respected by the individuals in that area. In the planning stages, this person will help define the workflow and technical requirements, review the new proposed workflow, may review the architecture components but especially the endpoints, help to determine project success metrics, and help determine the training plan that will be used. During implementation and rollout, this person will also assist with the training, monitoring of success, and various workflow and technical tweaks that will likely need to be made.

One can argue that the most important role of this position is to be a champion of change. As noted in the introduction, every system deployment involves people, process, and technology, and the clinical champion can help with all of those but is especially influential with people. Humans are naturally resistant to change and the champion can assist with addressing user concerns, describing the value of the program to the organization and individual, and serve as the go-between for the users and the larger project team.

### 3.4.2 IT Champion

The second role is the IT Champion. This person will be responsible for leading the technical components of the solution assessment and implementation. Cisco finds that the best person for this position is the Manager or Director who is responsible for the organization's video and communications infrastructure. As with the other roles, this person needs to be a change agent. This person should be a partner with the clinical teams and be focused on ways IT can deliver business value to their users.

### 3.4.3 Telehealth Champion

The last role this paper defines is a Telehealth Champion. Many times this is not a separate role but part of the responsibilities of the Clinical or IT Champion. However some larger organizations have hired a person who is solely responsible for the adoption and deployment of telehealth. Along with a change agent like the other roles, the role of this person will be to make sure a particular deployment is in line with the organization's overall strategy. Depending on the person in this role they may also be responsible for defining the strategy, determining best practices for roll-outs, and assisting with internal communication to applicable stakeholders.



**To help with a successful deployment, make sure the organization has defined project champions.**

## 3.5. Training Requirements

During the planning of the deployment of the solution you should develop a plan for training. This includes:

- Who needs to be trained in both clinical departments and IT supporting departments?
- What supporting documents are needed to supplement in-person training?
- Are their super users identified that will serve as train-the-trainer targets?
- Who will deliver the training?

In training keep in mind that there are two components: training on the technology and training on the workflow.

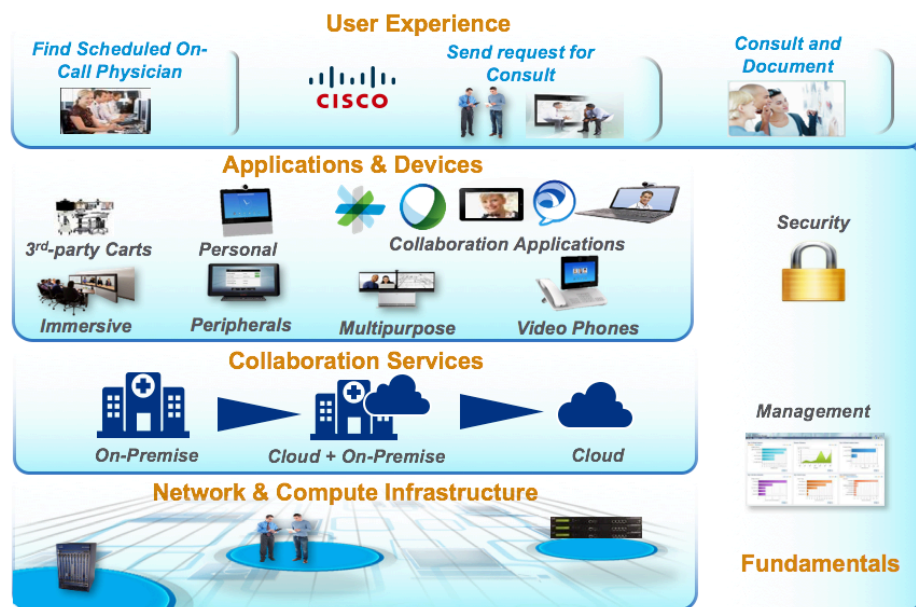


## 4. Architecture Components

Once you are at the point where you know what use cases you want to address today and in the known future, the proposed workflow for those use cases, and the desired features that will be required, it is time to put together the architecture components to address that solution. Overall, Cisco’s architecture strength is the use of a foundational open standards communications infrastructure that can not only serve multiple use cases for telehealth but also provide video, voice, and chat services for the organization’s other internal and external communications use cases. The Cisco collaboration architecture also provides a highly available infrastructure with integrated security that can be deployed on premise, in the cloud as a hosted environment, or in a hybrid deployment.

### 4.1. Cisco’s Approach to Telehealth Architecture

The diagram below explains Cisco’s high-level approach to an architecture strategy for telehealth.



As you see in this diagram, like a good foundation of any physical structure you start from the ground up, building layers on top of each other with each layer providing services to the one above it.

**Network and Compute Infrastructure** – The foundation of any IT system contains the route/switch and wireless infrastructure that will quickly transmit the data securely from one location to another and any compute components (servers) that will house the applications that provide the service’s functionality. The ‘Core Network’ section of this document describes recommendations for this level.

**Collaboration Services** – Video and communications back-end servers build on the Network & Compute Infrastructure. The exact components/servers required here will vary depending on the use case, but at a high level, the functionality provided includes endpoint registration, video session establishment and communication both inside the network and outside a firewall, scheduling, bridge management for sessions with more than two endpoints, managing the viewing experience across multiple endpoints with varying number of screens or resolutions, and recording as well as distribution of the video sessions. Additional detail on this level is found in the ‘Cisco Collaboration Foundational Infrastructure’ section of this document.

**Applications and Devices** – At this level you involve the end user facing components. Here you can leverage the depth and breadth of the Cisco endpoint portfolio, where there are endpoints ranging from video integrated into a web browser or mobile application, Spark and Jabber as software clients across a suite of operating systems, video phones, personal desktop and portable units, and room based systems. In addition, Cisco’s partners manufacture mobile carts to address specific use cases.

There are a few very important Cisco strengths here as it relates to the specific endpoint. The first is the flexibility to pick the endpoint that is the best for that particular use case. When you expand to other use cases you can simply use the same or different endpoint for that new use case depending on the specific needs. The second is having full interoperability and feature parity across the entire line. Thus a mobile application integrated video client on the “low” end can communicate with a fully immersive room based system on the “high” end and all the endpoints in-between. The third point is that these systems and endpoints are not just for telehealth but can accommodate multiple uses. For example, one can use a DX80 in the morning to conduct a telehealth session, use it later in the morning to call into a video bridge for tumor board, and then use it later in the day to have a video chat with a colleague to consult on a case. That same DX80 can also be used as a desktop monitor for a PC/laptop thus reducing the number of devices and clutter on a desk.

From a design and use case standpoint you can often stop at this point. Many telehealth use cases simply involve connecting one person to another replacing an in-person visit with a visit over video. Even in the cases where medical device integration is required, many times that is just displaying the output from the device, like an exam camera, over the video channel and integration to other workflow software is not required or would only be implemented at a later phase. For these situations where the features of a workflow software are not needed, the design can stop at this device level. Additional guidance on selecting endpoints is noted in the ‘Choosing an Endpoint’ section of this document.

**User Experience** – There are also use cases where additional workflow software is needed. Additional functionality like integrating billing, virtual queuing, EHR integration, e-prescriptions, and skill based routing is required. In this case, you then add on additional workflow software like Cisco Extended Care which enables video integration into an EHR or other third-party portal. It is important to continue with the foundational architecture and building blocks in that the workflow software leverages and integrates with the same endpoints, services, and infrastructure that they have already purchased and deployed. Again, Cisco’s approach gets away from a siloed deployment where one has a telehealth and communications system design that only serves one or a small handful of use cases, is difficult to manage, and does not scale. Additional guidance on workflow software is noted in the ‘Workflow Software’ section of this document.

**Fundamentals** – Along the right side of this diagram, notice that there is security and unified management incorporated into all levels of the stack.

**Deployment** – Lastly, across the stack there are multiple deployment options. You can deploy all the infrastructure on-premise, in the cloud, or a hybrid of the two depending on the needs and policies of the organization.

## 4.2. Core Network

This layer uses the Cisco Digital Network Architecture (DNA). This foundation enables digital transformation for healthcare. Our software-driven, cloud-enabled approach makes network management fast, simple, flexible, and automated. Cisco DNA technology can help you deliver differentiated offerings, personalize patient and member experiences, streamline workflows for care teams and clinical-trial researchers, optimize



clinical and business operations, and facilitate security and compliance, all while reducing IT costs and generating deeper network insights. It is the flexible and intelligent network you need for accelerated transformation, which is the heart of healthcare innovation. Cisco DNA, along with our comprehensive security portfolio, helps healthcare organizations gain effective security with integrated threat defense. With DNA, the network acts as sensor and enforcer, all the way from your organization to the cloud. Security is embedded network wide—across routing, switching, wireless, and the cloud—to speed threat detection and containment.

### 4.3. Cisco Collaboration Foundational Infrastructure

At the heart of the architecture design is the Cisco collaboration foundational infrastructure that is responsible for the server-side tasks.

#### 4.3.1 Core Video Infrastructure Architecture

The main functions of a call control infrastructure are endpoint registration, call routing, monitoring, and maintaining connections. Call control platforms also form the base for network dial plans and options for call admission control. Cisco offers both on premise infrastructure with Cisco Unified Communications Manager as well as aaS collaboration using Cisco Spark. Your current video and call control infrastructure is going to vary slightly based on when the system was implemented combined with what has been done for maintenance and upgrades, designs for prior functionality requirements, the layout of your physical locations, and your on-premise vs. cloud strategy.

Full details on architecture information and design is outside the scope of this paper but additional information can be found at:

- Unified Communications components including CUCM, Cisco Expressway, and WebEx can be found at <http://www.cisco.com/c/en/us/products/unified-communications/index.html>
- Cisco Conferencing related components including Conductor, WebEx, and TMS can be found at <http://www.cisco.com/c/en/us/products/conferencing/index.html>
- Cisco Spark can be found at <http://www.cisco.com/c/en/us/solutions/collaboration/ciscospark.html>

### 4.4. Choosing an Endpoint

Cisco has a suite of physical endpoints and soft clients to fit the needs of a large range of telehealth use cases. Cisco also enables users to use their personal devices running applications or web browsers with integrated video functionality. While this paper will not go into detail on all the endpoints, it will cover what Cisco sees as the most commonly deployed ones for telehealth.

#### 4.4.1 Soft Clients

For purposes of this paper, a soft client is an application program that enables video from a computing device such as a smart phone, tablet, or laptop. Cisco has four clients that come into play in telehealth being Jabber, Jabber Guest, Remote Expert Mobile, and Spark.

##### Jabber

Jabber is Cisco's software client that enables collaboration anywhere and across any device including those running Android, iOS, Windows, and MacOS.

Related to Telehealth, the primary use cases Cisco sees for Jabber are where the provider is not always, or in some use cases never, located next to a physical endpoint.

*Pros:*

- Flexibility of the endpoint device being a smart phone, tablet, or laptop. With an enterprise login across those platforms you have a unified contact list, presence, video, chat, and voice messaging functionality all with a consistent look and feel across device platforms.

*Cons:*

- The Jabber client is intended for employees of the organization. Is not well suited for patients, external physicians, etc. that do not have an account on the Cisco Call Manager.
- The client needs to be downloaded and installed which means it is not the best suited for a one-off video engagement where the employee will not have a regular or semi-regular use of video.

*Common Use Cases:*

- A provider who is traveling to patient's homes, homeless shelters, or otherwise conducting remote patient outreach and travels with a tablet or laptop that they wish to do video consultations from.
  - Cisco often gets questions about connectivity when the provider is mobile and outside of the hospital's premises. Most often in this case a cellular mobile access points (Mi-Fi) is used and with adequate bandwidth with a 4G/LTE signal generally video quality issues are not seen.
- Providers who are traveling around the hospital and are not commonly located at a desk or other location that has a physical endpoint.
- Providers who are employees of the hospital and want to have a video session from their tablet or laptop but don't conduct enough sessions or need the functionality to legitimize a physical endpoint. Common situations where Cisco sees this are internal provider-to-provider, no patient involved, video consultations.

**Jabber Guest**

Cisco Jabber Guest is a consumer-to-business (C2B) solution that extends the reach of Cisco's enterprise video to people outside of a corporate firewall who do not have devices registered with Cisco Unified Communications Manager. It provides a means for video to be integrated into a web page, iOS, or Android application or deliver the video natively on mobile devices using the Jabber Guest app.

Cisco sees the primary use cases of Jabber Guest being the web or mobile video client for patients and where an organization wants to fully leverage their current Cisco video infrastructure without many additional servers, licensing, or the need for professional services.

*Pros:*

- Chrome, IE, Firefox, and Safari support
- iOS and Android mobile support
- Registration of an account/phone on CUCM is not required
- Connectivity and interoperability with all other Cisco video endpoints and any vendor using H.264 AVC

*Cons:*

- You can only call out; you cannot call a Jabber Guest endpoint from another Cisco video endpoint
- No chat functionality
- Additional server-side components are required

### *Common Use Cases*

- Integration into a web portal or mobile application to serve as the patient-facing endpoint.

### **Remote Expert Mobile**

Cisco Remote Expert Mobile integrates video with business and mobile applications so patients can initiate face-to-face interactions with care providers and agents in the contact center. It allows video, voice, chat, screen mirroring, and remote annotation functionality to be integrated into a web page, iOS, or Android application.

Cisco sees the primary use cases of Remote Expert Mobile being the web or mobile video client for patients. It is a great fit where one wants a feature rich and heavily customizable client, or where additional functionality of voice, chat, screen mirroring, and remote annotation is desired. Remote Expert Mobile also has the advantage of tight integration into Cisco Contact Center, enabling skill based routing of incoming calls and an OmniChannel experience for customers/patients.

#### *Pros:*

- WebRTC, so no browser plug-in required for WebRTC compatible browsers
- iOS and Android mobile support
- Feature rich
- Highly customizable

#### *Cons:*

- You can only call out; you cannot call a Remote Expert Mobile endpoint from another Cisco video endpoint
- Additional server-side components are required.

### *Common Use Cases*

- Integration into a web portal or mobile application to serve as the patient-facing endpoint.
- With the use of Cisco Extended Care, integration into the telehealth workflow software web portal/interface
- With the use of Cisco Extended Care, integration into EHR web or mobile applications
- Enabling an OmniChannel experience with integration into Cisco Contact Center

### **Spark**

Cisco Spark is an app-centric, cloud-based service that provides a complete collaboration suite for teams to create, meet, message, call, care, white board, and share, regardless of whether they're together or apart—in one continuous work stream before, during, and after meetings. It is built to help teams work seamlessly. It is simple, secure, complete, and open, and provides a space for people to work better. The core capabilities of Cisco Spark are Meetings, Messaging, and Calling.

#### *Pros:*

- aaS without any on premise hardware required
- Features beyond video including chat, voice, and white boarding
- Flexibility of the endpoint device being a smart phone, tablet, or laptop
- End-to-end encryption
- SDK available for integration of video into a mobile or web application

#### *Cons:*

- Internet connection required for communications

*Common Use Cases:*

- Providers who are traveling around the hospital and are not commonly located at a desk or other location that has a physical endpoint
- Providers who are employees of the hospital and want to have a video session from their tablet or laptop but don't conduct enough sessions or need the functionality to legitimize a physical endpoint (common situations where Cisco sees this are internal provider-to-provider, no patient involved, video consultations)
- Organizations or other third-party vendors who want to easily integrate aaS video services into their mobile application or web portal

#### **4.4.2 Physical Endpoints**

At a high level, an endpoint consists of a screen, microphone, speakers, and one or more video and audio processing devices called codecs.

A complete matrix of Cisco's physical endpoints along with feature summaries of each can be found at <http://www.cisco.com/c/en/us/products/collaboration-endpoints/index.html>.

Of these endpoints, Cisco most commonly sees desktop personal systems DX70 and DX80 and the mobile video carts manufactured by Cisco partners deployed for a wide variety of telehealth use cases. Cisco also sees the rare use of multipurpose systems, the Cisco MX line, but generally do not see these purchased solely for telemedicine but rather used when the hospital wants to leverage their existing endpoint investment or has plans to have the endpoint for other traditional TelePresence needs.

*Pros:*

- The best video quality
- Additional TelePresence feature sets like integrated bridging and remote pan-tilt-zoom control
- Ability to receive a call as well as call out

*Cons:*

- Relative lack of mobility

*Common Use Cases:*

- Generally, Cisco will see the DX series used as the provider side endpoint for a multitude of use cases
- Mobile carts are a great format for bringing a high quality video experience to the patient's bedside
  - Note that many of the third party carts have inputs for medical devices and the output from the device can be sent over the video channel.

#### **4.5. Workflow Software**

As noted in the Architecture Components section, many telehealth use cases can be solved with just connecting one Cisco endpoint to another similar to what would be done in traditional TelePresence scenarios. However there are several use cases where you may need additional workflow software. In these use cases, additional functionality like integrating billing, virtual queuing, EHR integration, e-prescriptions, skill based routing, and so on is required. As previously described in the paper, this workflow software functionality can be provided via a third-party software or provided natively in the EHR while launching a video session directly from the EHR portal software.

#### 4.5.1 Functions of Workflow Software

In this section the paper will detail some of what Cisco sees as the important subset of functions that a workflow software can bring to the table and a high level overview on what purpose each function serves. The goal of this is for you to be able to have a consultative conversation with the project leaders as well as identify needs and requirements where you will need to add a workflow software component to the telehealth design. It should be noted though that instead of using dedicated telehealth workflow software many of these components can be accomplished by other manual or automated means that the hospital has in place. Therefore, when consulting consider these questions:

1. For your use cases do you need this functionality?
2. Do you have any mechanisms currently in place providing this functionality and if so do you plan on continuing to use these mechanisms going forward?
3. If set of functionality identified will be a net new addition, then identify the best workflow software system to meet those needs and allow for growth into future needs in line with the hospital's strategic direction.

Also, when thinking of these functions you will find that a majority are really electronic means that mirror the functions and needs that would occur in a traditional brick and mortar environment.

- **Visit Info: Reason for Visit** – Allow the person who is requesting the consultation, whether that is a patient or internal provider, to put in their symptoms, needs, and/or what expertise they are looking for. This can be used to help route the request to the most skilled provider (using skilled based routing), to trigger other workflow steps like a specific questionnaire to be completed, or to simply give information to the answering provider to know what the request is about.
- **Visit Info: Health Survey/Questionnaire** – The ability, commonly for the patient, to fill out a health questionnaire form similar to one that you would fill out in the physician's office.
- **Provider Availability** – This can break down into two components. The first is a calendaring system to input what providers are assigned to cover incoming calls for that specialty and at that time, and you can think of this as an on-call calendar. The second part of this is for those providers that are assigned, who are currently available as determined by not currently being on another call or via some sort of integrated availability presence functionality.
- **Skill-based Routing** – Using Reason for Visit combined with Provider Availability, route the request to the most skilled and available provider.
- **Patient Queue** – The ability that when a patient initiates the session from their side that they are placed in a virtual queue pending the provider to join the session. This is done as opposed to directly calling the provider. For a brick and mortar analogy, think of an urgent care clinic where the “queue” is the room you are waiting in and the nurse and physician come in and out of that room as opposed to you walking directly up to the physician and initiating the visit.
- **Notification of Waiting Patient** – When a patient is in that virtual queue how is the provider notified that they have a waiting patient? Many systems will send a text message or phone call informing a designated person that the patient is in queue.
- **Scheduling and Calendaring** – The ability for a patient to either request a time window when they would like to have an appointment or ideally just pick a specific time in the future. This functionality would not necessarily apply to situations where the consultation is requested and initiated immediately. If a window of time is requested then the workflow needs to be determined for who sees that request and schedules the specific time during that window. Once the specific time is determined, either automatically or manually, it needs to be determined how the provider will see that request

(calendar) and how they are notified that they have a new appointment. Also it should be determined if there any other parties that need to approve a request prior to it being made official.

- **Patient History** - Directly though the workflow software does the provider need to be able to see the patient's medical history? Note that the key functionality distinction here is do they have to see it through the telehealth workflow software itself or will they view it directly though the EHR interface that they may have running in parallel.
- **Registration for New Patients** - For some use cases the hospital is targeting the program to get new patients into their health system, and if this is the case what will the process be to have the patient create a user ID/password and provide the information that the hospital requires for registering a new patient in their system?
- **Medical Device Integration** - Does the use case require the transmission of data from medical devices such as stethoscopes or exam cameras over the video channel? Then, related to the workflow software itself does any data or pictures from these devices need to be entered into the workflow software? A point of clarification here is that you should separate out the use and transmission of any audio or video from devices from the entry of data that these devices create. For example, it is a completely different set of requirements to say that there is a need to use an exam camera to transmit the look of a rash over the existing video session rather than saying pictures from this camera need to be stored in the workflow software. Then, if those images are stored there is a key difference between the functionality to manually upload these pictures as opposed to having them automatically entered in the system when they are taken.
- **Document Share** - The capability for a provider or patient to be able to bring up a document, medical image, or perhaps application such as an EHR and be able to share that material or their screen over the session.
- **Educational Videos** - The capability for educational videos to either be directly stored in the system or the system's ability to link to a video share. Then, a provider can assign videos for the patient to watch, the patient has remote access to those videos, and watching of those videos is logged for compliance.
- **EHR Integration** - If the video session is not launched from the EHR directly, the ability to enter data measurement and findings data directly in the workflow software and have that data automatically sent to the EHR at the conclusion of the session likely though HL7 integration.
- **Patient Viewing Results** - The ability for the patient to receive and/or be able to view online the results of their session.
- **Secure Messaging** - The ability to send a HIPAA compliant secure message between providers, from the provider to the patient, or patient to provider.
- **E-Prescribing** - The ability for the provider to enter an electronic medication prescription and have it sent to one of many partnering pharmacies.
- **Billing** - The ability for the patient to pay for the service prior to that service actually taking place. This may be paying a co-pay in the event that the patient is covered by insurance or could be paying for the entire cost of the visit in the case of high-deductible insurance plans or could be a completely out-of-pocket payment. The part of taking the payment can often be the easier part of this functionality and what may be more technically complicated is how do you determine how much to charge? Things that can factor into the amount of the charge are the type of visit, the type of insurance the patient has, and any promotions the hospital is putting on.

#### **4.5.2 Launching Video Session Directly from the EHR**

As opposed to using a third-party workflow software, Cisco often finds that our customers desire to launch the video session directly from the EHR interface that their providers and patients are using. This eliminates the need to do a HL7 or API integration between the third-party system and the EHR as well as the need to sync information and results between the two systems. This also provides the same user interface and workflow for providers which has a significant positive impact for adoption. Cisco provides this functionality with Cisco Extended Care. Extended Care takes a vendor agnostic approach providing a platform enables video integration, leveraging the Cisco collaboration infrastructure within any relevant workflow offered by a third-party portal solution.

**Additional information on Extended Care can be found at:**

<http://www.cisco.com/c/en/us/products/video/extended-care/index.html>