Mission Statement

The mission of C&C’s Communications unit is to facilitate UCR’s teaching, research, and public service efforts by providing reliable, secure, innovative, and technically sophisticated infrastructure and services. As Communications provides these services, the unit will operate within budget and per the campus approved rate schedule.

Goals

Communications will realize and accomplish its mission by placing fundamental value on responsive customer service, timely infrastructure renewal and replacement, and providing a very robust and reliable production environment that offers a broad range of services and support. In addition, Communications will continue to focus on providing an appropriate level of security and offering an innovative vision of potential services and support that will assist the University in reaching its teaching, research, and public service goals.

Objectives

Providing Responsive Customer Service.

Communications will provide continuing training and outreach to campus departments utilizing Communications services and infrastructure. The goal of this outreach is to enable customers to completely understand the Communications billing systems and processes, to easily request highly technical services in a manner that will facilitate delivery of these services, and to utilize communications technology to the greatest possible departmental benefit. As tangible measurements of success in this area, Communications will strive to achieve the following “work order” and “trouble ticket” response times:

1. **Loss of Service.** Four-hour restoration of service.
2. **Emergency Add, Move, or Change.** Completion of work in 24 hours.
3. **Standard Add, Move, or Change.** Completion of work within 10 business days.
4. **Major Project (departmental move, multiple office move, but not including new building construction).** Completion of work within 45 working days (or within C&C/customer agreed upon guidelines).

Timely Infrastructure Renewal and Replacement.

Renewal and Replacement of UCR’s communications infrastructure on a stable and predictable basis is vital to the success of UCR’s teaching, research, and public service missions. A complete Renewal and Replacement plan (for both voice and data infrastructures) is contained in this document. Communications will strive to
meet the objectives found in this plan and to provide documentation annually concerning the plan’s implementation. The following items are included in the renewal and replacement plans:

1. **Data Network**: Network Electronics for desktop connectivity, Core Network Electronics, Building Entry Network Electronics, Wide Area Network Electronics, Remote Access, Fiber Copper Infrastructure, Data Communications Closets, Network Services, Internet Connectivity, Corporate Servers and Software, Monitoring & Security, and Research and Development.

2. **Voice Network**: Phone Switch, Distributed Infrastructure, Instruments, and Port Cards.

**Robust and Reliable Production Environment**

Communications will strive to meet the following objectives relating to its voice and data production services:

1. **Voice (dial tone) availability** (not including announced, planned maintenance): 24 hours a day, 365 days a year with total downtime limited to 4 hours per year (99.95% uptime).

2. **Data (network) availability** (not including announced, planned maintenance or Internet 2 downtime): 24 hours a day, 365 days a year with total downtime limited to 24 hours per year (99.7% uptime).

3. **Voice and Data Maintenance Announcements**: A minimum of 72 hours notice for major, planned maintenance. A minimum of 24 hours notice for minor planned maintenance.

4. **Voice and Data Planned Maintenance Scheduling**: Before 7:30 AM and after 5:30 PM Monday through Friday. Before 11:00 AM and after 3:00 PM on weekends.

Communication is preparing a complete suite of production and maintenance objectives. This document will be completed prior to the end of FY 01/02.

Importantly, C&C believes that proactive communications (informing the campus of planned maintenance, problems with productions systems, problems with external service providers, etc.) is a vital aspect of a robust production environment. In order to provide the campus with information about the voice and data network, C&C supports the Status Page (please visit status.ucr.edu) and the Weather Page (please visit weather.ucr.edu) and maintains an e-mail listserv used for communicating information regarding minor, planned downtime. Major planned outages are always communicated to the campus via Scotmail.

**Broad Range of Services and Support**

Communications will strive to offer the broadest range of services and support possible, given resource and technology constraints. The replacement of the GTE 4600 phone switch (*) will allow Communications to provide enhanced levels of support (for example, greatly improved campus-wide 911 services).

* Please note that both the data and voice industries utilize the term “switch”. The data industry uses the term “switch” to refer to devices, generally distributed physically throughout an organization, that connect hardware (PCs, printers, etc.) to the network. The voice industry uses the term “switch” to refer to systems that provide dial tone and access to local and long distance services. To avoid confusion, C&C attempts to qualify the term “switch” each time it is used in this document (by referring to the “voice system” as either the GTE 4600 switch, the phone switch, the voice switch, etc. and by referring to data network switches as network switches, data switches, etc.).
**Appropriate Level of Security.**

C&C is constantly reviewing campus “cyber security” and updates plans and documentation regularly in response to security threats facing the campus. For FY 01/02, a primary security objective is to deploy a PC based firewall to protect high-risk campus networks. The following three paragraphs are excerpts from a response C&C provided to UCOP regarding network security at UCR.

"In general, to support the open and distributed nature of campus computing, C&C has historically viewed network security as a suite of responses to attacks rather than a set of tools that try to predict and eliminate most or all network intrusions before they occur. While C&C utilizes tools that stop problems at the campus border router, detect intrusions, and monitor traffic for denial of service patterns, our stance is generally to "allow first" and then "deny as necessary" rather than the reverse.

Importantly, this philosophy assumes that the campus WILL be both the source and destination of some quantity of cyber attacks and that these attacks are a necessary aspect of maintaining a viable network at a research university.

Finally, during the past three years (utilizing the strategy outlined above), C&C has been able to detect, respond to, and resolve attacks on the campus network and reasonably limit the amount of downtime for problem resolution and service restoration."

**Innovative Vision of Potential Services and Support enabling UCR to meet its Mission of Teaching, Research, and Public Service.**

Communications will continually review peer institutions, similarly sized organizations, vendor announcements and white papers, and industry publications for innovative ideas and best practices for possible campus deployment. These ideas and best practices, given resource and technology constraints, will be presented to executive management (Chancellor, EVC, Deans, VCs) for possible campus deployment. The most current example of an innovative implementation of new technology is the recently deployed campus wireless network.
Communications Planning Assumptions

UCR is experiencing unprecedented growth that will continue over the next 8 to 10 years. During this time, communications technology will evolve as never before and these technologies will have a profound impact on the university. The budgetary and rate proposals contained in this document revolve around certain high level assumptions concerning technology, campus growth, and functional/business issues. The following is an overview of these assumptions.

1. UCR’s student population will grow to over 20,000 during the next 8 to 10 years.

2. Communications technologies will continue to evolve rapidly and campus (faculty, staff, and student) demand for these emerging technologies will be extremely high.

3. Voice, data, and video transport mechanisms are converging (voice, data, and video, in other words, will be supplied to the campus on a common infrastructure). To some limited extent (supporting certain campus constituencies and applications) this will become a functioning reality within 2 years. This issue is having (and will increasingly have) a dramatic impact on traditional toll expenses and revenues (and because of these changes, it is no longer viable for the campus to burden tolls to recover data network costs).

4. Computer telephony (voice over the data network) will not be ready for enterprise (campus-wide) deployment for at least 3 to 4 years.

5. UCR will electronically host digital content and services that faculty, staff, and students (as well as key non-campus entities such as the K-12 community) will wish to access.

6. Remote (off campus) high-speed network access will be an important service that the university wishes to support.

7. Renewal and replacement of UCR’s voice and data network will occur on a periodic and therefore predictable basis (e.g. 4 years for the electronics and 15 years for cable plant and building wiring).

8. Allocation of corporate assets (fiber, network electronics, IPs, network ports) will continue to be controlled by executive management (delegated to C&C).

9. UCR wishes to promote (as opposed to “contain”) the use of UCR’s communications infrastructure for purposes of research, teaching, and public service. In discussions with campus faculty, staff, and students, a desire is often expressed that network access be made available via a “library” or “utility” model.

10. Capital budgets for new buildings will continue to fund the required network electronics and inside cable plant (building specific infrastructure) required to provide service to these new buildings. Communications rates will be established to fund the expansion of outside cable plant (“core” infrastructure such as Air Blown Fiber and conduit) required by new building construction. C&C will continue to provide voice electronics associated with new building construction.

11. Rates will be established in such a way as to provide for limited expansion of the voice/data infrastructure within existing buildings. Deans and Vice Chancellors will determine priorities within their units for expansion of the network within existing buildings.

12. To the greatest degree possible, C&C should attempt to ensure “end to end” service quality throughout UCR’s network.
13. UCR’s phone switch will be replaced within 6 months.

14. Communications (in consultation with faculty and various campus organizations) has developed guidelines for campus data and voice access (specifically, the number of voice and data ports users should expect based on “type of space” and “square footage”). These guidelines are defined in the Communications Infrastructure Planning Standards document. In general, customers should expect 1 voice and 2 data ports per 100 square feet in a typical office configuration. C&C will, on an as needed basis and in consultation with Deans and Vice Chancellors, increase the number of network ports when offices, labs, classrooms, etc. are not in compliance with the Standards Document. Any augmentation to port counts NOT included in a given year’s network renewal and replacement plan will only be added if the department or individual requesting the ports fund the electronics acquisition. Similarly, any department or individual requesting ports exceeding the quantity specified in the Communications Planning Standards Document must fund the cost of these ports.

**Technical Themes and Priorities, Next Five Years**

Communications has developed six Technical Themes/Priorities (based on the aforementioned goals, objectives, and planning assumptions) that will guide its efforts during the next five years. These themes/priorities are as follows:

1. **A new IP enabled phone switch will be deployed allowing Communications to solve very pressing campus needs for increased voice reliability and capacity.** During subsequent years, the new switch will allow the campus to replace Mitel and Merlin instruments in the most technically appropriate manner (via Voice over IP phones or digital phones) as well as introduce new voice features to the campus (e.g. unified messaging).

2. **Faculty, staff, and student access to the campus intranet and to Internet 2 will be continually optimized.** Therefore, the campus will follow a predictable and stable renewal and replacement plan relating to network electronics, campus access to Internet 2 will be upgraded (from a single 155 Mbs OC3 connection to multiple gigabit interfaces during the next 12 months), and the campus will aggressively participate in the UCOP facilitated Optical Network Initiative (ONI) which will provide on-going, major Internet 2 upgrades.

3. **The campus will collaborate, primarily with other UC campuses, on the design and implementation of network security and monitoring systems that adequately protect UCR’s assets while maintaining high usability and ensuring academic freedom.**

4. **Support for campus growth will be provided by active participation in all new building / major renovation planning efforts (especially relating to voice and data infrastructure visioning, planning, and budgeting).**

5. **UCR (to the greatest degree possible and to support the teaching, research, and public service missions of the university) will work to extend the campus core network into the surrounding community.** Examples include privately owned student housing, the Heckman Center, and CE-CERT. All potential transport mechanisms will be investigated (dark fiber, campus owned fiber, wireless, etc.).

6. **All decisions relating to network renewal and replacement will be made using the vision of a converged network as a primary factor.** UCR will build a network capable of transporting voice, data, and video over a common infrastructure to support emerging services and applications that will utilize the campus network during the next five years.
Accomplishments: FY 99/00, 00/01, and 01/02 and Tactical Plans for FY 02/03

FY 99/00:

• Isolated and remediated all year 2000 issues associated with campus voice and data systems allowing campus to enjoy ZERO Y2K problems or incidents.

• Completed the upgrade of UCR’s core network to switched, fast ethernet (multiple 100 Mbs path between three core campus routers).

• Completed approximately 60 percent of building electronics upgrades (from shared 10 Mbs ethernet to fast ethernet) allowing for deployment of the campus financial system and other applications requiring high-speed network throughput.

• Deployed 2,000 new network connections to campus residence halls (A&I and Lothian). This was accomplished with NO CONSULTING assistance from private sector vendors. Each dorm room contains two switched, fast ethernet connections.

• Successfully participated in the UCOP facilitated Internet 2 network initiative (this is the NSF funded high speed, private network for higher education). UCR participates in the California network known as CalREN2.

FY 00/01:

• Deployed 750 new network connections and supplied voice services to new campus residence halls (Pentland I). This was accomplished with NO CONSULTING assistance from private sector vendors. Each dorm room contains two switched, fast ethernet connections.

• Engaged in “Public / Private Partnership” and extended campus backbone network to Stonehaven apartment complex. Deployed 500 new network connections at the complex. This effort (which provide ultra high speed connectivity to UCR students leaving the residence halls) is a “best practice” within the UC system.

• Completed remaining building electronics upgrade (from shared 10 Mbs ethernet to fast ethernet or switched 10 Mbs ethernet).

• Planned and deployed Phase I of the UCR “wireless” network (including the Rivera Library, the Science Library, COE, AGSM, and the Commons).

• Acquired the UCR (827) prefix and deployed it to support the Pentland Residence Hall voice implementation.

• Deployed a web based service request system as well as an automated work order management and billing system. Deployed “best of breed” system for student web access to toll and other communications charges.

• Upgraded UCR’s core network to Gigabit (1000 Mbs).

• Completed voice and data installations associated with the Rivera Library phased renovation/remodel.

• Completed voice and data installations associated with the Pierce Hall renovation/remodel/expansion.
• Deployed campus voice and data network to the new Computing and Communications building.

FY 01/02:

• Engaged in “Public / Private Partnership” and extended campus backbone network to Grand Mark and International Village apartment complexes. Deployed 750 new network connections at these complexes.

• Deployed campus voice and data network to the new Fine Arts building.

• Deployed campus voice and data network to the new Surge building.

• Deployed campus voice and data network to the new I&Q building.

• Upgraded campus E-911 system.

• Developed and issued an RFP for the new phone switch.

• Upgraded University Extension network from shared Ethernet to 10 Mbs switched.

• Upgraded TACAS capable network switches on campus for improved security.

• Upgraded campus router located in Stat-Comp and began supplying Gigabit connections to buildings on the east side of campus.

• Completed planning of Phase II of the campus wireless network.

• Collaborating with COE, AP&B, and Design and Construction, developed the Interim Communications Planning Standards Guidelines (please see the attached document).

• Completed major remodel projects for Hinderaker Hall, Watkins Hall, Boyce Hall and Olmstead.

FY 01/02 Planned:

• Deployment of campus voice and data network to the new Entomology building.

• Phase II Deployment of campus wireless network.

• Upgrade of Telecommunications building router (allowing for Gigabit building connections on the west side of campus).

• Upgrade of router supporting Internet 2 connection (allowing for at least a doubling of speed for off-campus network traffic; depending on UCOP initiatives, this may be delayed until January 2003).

• Deploy IP enabled telephone switch (replacing GTE 4600).

FY 02/03 Planned:

• Upgrade of Sproul building router (allowing for Gigabit building connections on the south side of campus).
• Design, plan and implement the Pentland II data and voice networks.

• Design, plan and implement the University Village Bookstore data and voice networks.

• Design, plan and implement the Heckman Center voice and data networks including the links to the UCR campus.

• Design, plan, purchase and install communications outside plant for Physical Science, Engineering II, Bio Science, and Alumni buildings.

• Upgrade approximately 20 building entry devices to support Gigabit ethernet connections to the UCR campus core network.

• Upgrade approximately 3,500 data network connections to fast ethernet (this will include upgrading wiring in some circumstances, for example, AGSM and University Extension).

• Hire Network Security Administrator (currently a PA IV open provision in the Communications budget).

• Upgrade network monitoring, security, and management hardware and software systems.

• Upgrade network hardware that supports traffic shaping to manage commodity internet costs (especially relating to residence network traffic).

• Begin replacement of Merlin telephones and key system equipment (as a follow up to the FY 01/02 GTE switch replacement).

• Select and implement a campus VoIP beta test.
Rate Development Overview and Vision for Future Rate Development

As UCR grows over the next 8 to 10 years, communication technology will have an ever-increasing impact on campus life. As a result, it is in the university’s best interest to pursue a *stable, robust, and flexible communications funding model* that will allow UCR to integrate emerging technologies (on a continuing basis) into the academic and administrative functions of the university.

To enable this, Computing and Communications is proposing a *short-term* rate strategy that will serve as the foundation for *long-term* rate development.

The short-term strategy includes the development of a Communications Worker fee that will recoup data network infrastructure and services costs. A very brief overview of FY 02/03 proposed “lines of business” and rate development strategies follow, as well as an in-depth discussion of the Communications Worker rate methodology and associated issues.

FY 02/03 Proposed Lines of Business and Rate Development Strategies:

- **Voice Line** (this is dial tone, charged by line or extension, not burdened by network costs).
- **Instrument Support** (charged by type of instrument, includes any and all maintenance and support required).
- **Labor Fee** (for Moves, Adds, and Changes; all problem resolution costs are included in other rates).
- **Auxiliary Services** (includes Voice Mail and Auto Attendant).
- **Tolls** (charged at cost plus over-head, not burdened by network costs).
- **Administrative Processing Fee** (charged by “document” processed on behalf of a campus department).
- **Communications Worker Fee and Student Housing Communications Fee** (recovering network service costs heretofore included in the Basic Service and Tolls lines of business).
- **Premium Commodity Internet Access** (a rate that allows organizations to request additional commodity internet bandwidth).
- **Computer Facility Support** (a fee that appropriately charges large, public computer facilities for network costs not recovered as part of the Communications Worker fee).

**Communications Worker Fee, Introduction and Definitions:**

The Communications Worker fee will recover data network costs through a monthly charge per FTE. The Communications Worker fee will be assessed by payroll title code (downloaded monthly from PPS). Certain title codes, e.g. custodians, will not be included in the Communications Worker model.

The definition of a Communications Worker is as follows:

1. **A Communications Worker is a campus employee paid via the campus Payroll Personnel System (PPS).** PPS title codes determine whether or not an employee is included in UCR’s database of Communications Workers. The campus Committee on Sales and Services Activities (COSSA), in consultation with departmental, unit, and college administrative and financial leadership, approves the list of Communication Worker title codes.

2. **A Communications Worker has direct access to the campus network** (this access can be via a network port, the wireless campus network, or a privately shared network port). An employee (title code) who
exclusively accesses the network via a publicly shared port (e.g., a public kiosk for access to PPS benefit web pages) will not be considered a Communications Worker.

3. A Communications Worker utilizes the campus network in the performance of his or her duties at UCR. Using the network may include e-mail, hosting or accessing web pages, utilizing campus network enabled applications (Blackboard, PeopleSoft), etc. The “amount” of network usage does not determine whether or not an employee (title code) is considered a Communications Worker.

Communications Workers will receive a suite of network services that will change over time. Initially, these services will include the following:

- Internet Access
- Intranet Access
- Basic E-mail Service
- Network Security and Trouble Shooting, Domain Name Services (DNS), and other infrastructure services.

**Communications Worker Fee, Benefits and Advantages:**

- **The Communication Worker fee is a “Technology Transparent” rate model.** It attempts (to the greatest degree possible) not to link rates and fees to any specific technology. Therefore, as technologies change and C&C implements new systems, services, and products, the funding mechanism remains stable and predictable (since funding is linked to the number of Communications Workers and not to any given service or technology). This “Technology Transparent” rate will therefore facilitate campus implementation of a converged network, where voice, data, and video are all transported on a common infrastructure.

- **The Communication Worker fee will encourage the use of the data network for academic and administrative purposes.** Departments will avoid large, initial “out of pocket” expenses to access the network and will (by policy) be charged for all FTE within certain title codes. Since there is no way to avoid the Communications Worker fee, the incentive will be for faculty and staff to utilize the data network.

- **The Communications Worker fee (unlike an IP or active network jack fee) will not encourage inappropriate departmental or unit behavior to avoid costs.** For example, at other institutions recovering network costs via an IP or active jack charge, some users independently purchase network electronics and “hide” this equipment behind a single IP address (using NAT, Network Address Translation, for example).

- **The Communications Worker fee resolves billing problems associated with mobile computing.** For example, wireless network access, by definition, does not require a fixed IP address or an active network jack. DHCP (dynamically provided IP addresses) allows users to obtain network access without an assigned IP address or even an assigned active network jack (DHCP, in a particular building, will allow network access from any active jack in the building). Since it is “Technology Transparent”, the Communications Worker fee resolves the mobile computing dilemma.

- **The Communications Worker fee also resolves problems associated with departments that maintain semi-autonomous networks** (that is, networks that are co-managed by the department and C&C). In these circumstances, C&C provides the department with blocks of IP addresses and access to network switches. Departments are therefore capable of activating network jacks and utilizing IP addresses as needed. Currently, the College of Engineering, Housing (particularly the residence halls), and the Library partner with C&C co-managing departmental networks. Once again, even in this distributed
network management model, the Communications Worker fee provides a stable funding mechanism while allowing for flexible technology deployment and management.

**Communications Worker Fee, Other Notes:**

*Title Codes and Partial Charges.* C&C has proposed a list of title codes to be included as part of UCR’s Communications Work fee implementation. This suite of title codes has yielded a Communications Worker rate for the campus. Obviously, other institutions utilizing the Communications Worker model have adopted a different set of title codes to support their rate development (and, in some circumstances, have “discounted” certain title codes in the hopes of achieving fairness in the distribution of network costs). C&C believes that two factors should drive the consideration of which title codes should be included, and which -if any- title codes should be “discounted”. A brief discussion of these two factors follows:

1. **Equity Versus Existing Fees.** The inclusion or exclusion of various title codes will result in a particular distribution of network expenses across campus departments and units. C&C recommends (within common sense guidelines) including or excluding title codes so that total communications costs -under the new rate structure- mirror existing costs to the greatest degree possible.

2. **Simplicity.** As has already been mentioned, one factor in determining the list of title codes is equity versus total existing communications fees. To the extent that equity can be achieved *without* “discounting” certain title codes, the resulting Communications Worker fees will be *less complex* to understand and implement. Budgeting, forecasting, billing, etc. will be facilitated if all title codes are fully and equally charged.

The Communications Worker rate contained in this document was calculated *without* “discounting” any title codes.

**Vision for Future Rate Development:**

During the next 3 to 5 years, changes in technology (particularly converged networks and emerging new network based services) will make the proposed 02/03 rates and lines of business obsolete. For example, dial tone will be provided via the data network and users may elect to have their personal computers serve as telephone instruments. Without a doubt, the need for a flexible, scalable, and “technology transparent” rate structure will be critical as communications technology evolves during the next ½ decade.

C&C therefore proposes to ultimately “fold” all service offerings into a tiered Communications Worker rate structure. This tiered structure will allow campus users to select from several alternatives that provide varying levels of services for varying monthly fees. A sample “tiered service” offering is presented below. Please keep in mind that this is only one sample of a tiered structure and that future offerings may differ dramatically from those listed below (depending on technological changes and campus requirements for services and functionality).

**Communications Worker – Possible Future “Tiered Rate” Option**

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<thead>
<tr>
<th>Tier A</th>
<th>Tier B</th>
<th>Tier C</th>
<th>Tier D</th>
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</thead>
<tbody>
<tr>
<td>Dial Tone</td>
<td>Dial Tone</td>
<td>Dial Tone</td>
<td>Dial Tone Only</td>
</tr>
<tr>
<td>E-Mail (POP Services, IMAP, WEB Mail)</td>
<td>E-Mail (POP Services, IMAP, Netscape Mail)</td>
<td>E-Mail (POP Services, Eudora)</td>
<td></td>
</tr>
<tr>
<td>Expanded Set of Voice Features (Caller ID, Personal Ring, etc.)</td>
<td>Expanded Set of Voice Features (Caller ID, Personal Ring, etc.)</td>
<td>Standard Set of Voice Features (Call Forwarding, etc.)</td>
<td></td>
</tr>
<tr>
<td>Web Corporate</td>
<td>Web Corporate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Calendaring Access | Calendaring Access
--- | ---
Voice Mail (expanded access, minutes, paging) | Voice Mail (limited access, minutes)
Unified Messaging Services
Wireless On-Campus Cell Phone Access
Rate = $xxx per worker | Rate = $xxx per worker | Rate = $xxx per worker | Rate = $xxx per worker

Notes:
- Multi-button instruments will be provided to campus users at cost plus a maintenance fee.
- Tolls will be provided at costs plus minimal overhead.
- Moves, adds, and changes will be provided at fully costed rates.

**Student Housing Communications Fee, Definition and Notes:**

The *definition* of the Student Housing Communications Fee is as follows:

The Student Housing Communications Fee is assessed on all active network ports in campus residence halls that provide students *direct, private access* to the campus network. The Student Housing Communications Fee is also used to recover costs associated with providing service to privately owned student housing (e.g. Stonehaven, Grand Mark, International Village, etc.).

C&C proposes charging Housing (*) a one time annual fee for voice and data access, maintenance, support, monitoring, and trouble shooting (presumably at the start of the academic year or perhaps quarterly). Access to the internet will be included but limited to a specific amount of bandwidth (a negotiated amount of megabits per second). Housing management will be free to pass these fees through to students as they see fit (e.g. as part of the monthly rent, with or without a markup, etc.). Toll calls will be passed through at cost (plus an appropriate mark-up for overhead). Details concerning this methodology are as follows:

* Please note that there are a small number of students living in University Extension housing that will be treated in the same fashion as residence hall students. Therefore, all notes in this document that pertain to Housing also apply to UNEX. C&C would obviously interact directly with UNEX concerning billing, etc. for these students.

1. *Data Network Access.* The annual Student Resident Housing fee for network access will be calculated by multiplying the Student Housing Communication Fee times the number of data ports available. Network access includes unfettered (wire speed) access to UCR intranet, unfettered (wire speed) access to Internet 2 sites, and a specified level of bandwidth to “commodity” (fee for service) internet sites. The level of commodity internet access (bandwidth) will be negotiated annually with Housing (please see the note on Commodity Internet Access Charge).

2. *Voice Access.* The annual Student Resident Housing fee for voice access will be calculated by multiplying the Voice Line (dial tone) rate times the number of available voice extensions (that is, specific numbers). The annual fee will provide each voice jack with dial tone, campus access (at no charge), local and long distance access, and 911 service. Currently no other options are available. However, implementation of a new telephone switch (tentatively scheduled to be completed by the summer of 2002) will allow for enhanced features including call waiting and caller ID. The existing
phone switch is not capable of providing voice mail to all residence hall occupants; however, after
installation of a new voice mail system, a residence hall voice mail rate will be calculated.

3. **Toll Charges.** Toll calls will be billed to students at the cost of providing the service and will no
longer be burdened to recover data network costs.

**Network Service to Privately Owned Student Housing (e.g. Stonehaven, GrandMarc, International Village,
etc.):**

Computing and Communications currently supplies network access to privately owned student housing when
this arrangement provides mutual benefit to the university and the housing owner.

Off campus student housing will be charged a monthly fee equal to Student Housing Communication fee
multiplied by the number of active data ports (this is per the Memo of Understanding signed by each off
campus housing entity connected to UCR’s core network). Each month, C&C will informally audit the
number of active ports supplied by each off campus housing entity for reasonableness. Twice per year, C&C
will conduct a formal, full audit of active ports. The following few notes pertain to off campus student
housing services:

1. Non-UCR students living in off campus student housing will NOT be granted access to the campus
data network (this is per the Memo of Understanding signed by each off campus housing entity
connected to UCR’s core network).

2. Off campus student housing network infrastructure costs must be completely funded by the vendor
(including network electronics as well as inside and outside cable plant). The infrastructure will be
built out per the specifications contained in the Interim Campus Communications Planning Standards
Document.

**Rate for Premium Commodity Internet Access:**

UCR is charged for campus access to the “commodity internet” (the commodity internet includes all non-UCR
and non-Internet 2 sites on the internet). The fee for commodity internet access is negotiated by CENIC
(California’s Internet 2 oversight body) in collaboration with UCOP and the various UC campuses. C&C
includes in its “base budget” an appropriate and reasonable level of campus access to the commodity internet.

However, there are campus entities and organizations that desire additional access to the commodity internet.
Stated differently, these entities are requesting additional, dedicated bandwidth for their particular networks.
Since aggregate bandwidth to the commodity internet is measurable by campus “subnet” (and the rate is
known), C&C can provide this bandwidth at a known cost per Communications Worker (or by active Student
Housing Communication network port).

The rate for premium / dedicated Commodity Internet access will vary (must vary) by organization (the
methodology of calculating the rate, however, will be consistent across the campus). The rate will vary based
on the number of Communications Workers (or students) in question and by the amount of additional
bandwidth that is requested. For example, the College of Engineering (COE) might request an additional 50
Mbs of Commodity Internet bandwidth, and this bandwidth might be allocated across 100 communications
workers throughout the College. The additional COE bandwidth, allocated across the COE Communications
Workers, yields a COE rate for Premium (Dedicated) Commodity Internet Access. This rate, in all probability,
will not be that same as the rate for Housing, which has a completely different set of variables.
Additional Commodity Internet access will be provided at cost plus a reasonable markup for overhead. Currently, the only campus entity requesting additional Commodity Internet access is Housing. Therefore, C&C has included in its proposal a Premium Commodity Internet Access rate for Housing.

Please note that a “subnet” is usually a segment of UCR’s network (a or group of network segments) associated with a building or organization.

Public Computer Facility Support Fee:

As was mentioned during the introduction to C&C’s proposed rate methodology, the Communications Worker model provides UCR with a stable, robust, and flexible communications funding model that will allow UCR to renew and replace the campus network as technology changes in the years ahead. Nonetheless, the Communications Worker model is not a perfect methodology. Perhaps the greatest challenge to the methodology are computer facilities (especially large, public labs) where the number of Communications Workers does not adequately recover the organization’s share of network renewal and replacement or operating costs.

After examining its role supporting these computer facilities, C&C has determined that large, public computer labs -in general- will not generate sufficient renewal and replacement funding under the Communications Worker model. Please note that these facilities typically do not generate additional operating costs and therefore do not warrant increased cost recovery in this area.

As a result, for certain campus computer facilities, C&C is proposing a Public Computer Facility Support fee that will be calculated on an entity by entity basis and charged to the organization responsible for the computer facility annually (or perhaps quarterly).

Importantly, the only item that is included in the renewal and replacement budget for these facilities is the network electronics associated with the lab (not the computers, servers, printers, etc. that are maintained by the facility itself).

Public Computer Facility Support Fee, Methodology

C&C is proposing linking the Public Computer Facility Support fee to the Communications Planning Standards Document as follows:

1. For a select number of computer facilities, C&C will calculate the total number of active ports used in the facility.

2. C&C will then multiply this port count by the “cost per new building network port” contained in the Communications Planning Standards Document (as of 1/1/2002, this cost is $155 per port). This yields the total cost required to renew and replace the facility’s network.

3. This amount will be divided by the renewal and replacement cycle contained in the Standards Document (currently, as of 1/1/2002, six years for most items). This yields the annual renewal and replacement obligation for the facility.

4. The total annual Communications Worker revenue is then calculated for the entity in question.

5. Finally, C&C will subtract the total annual Communications Worker revenue from the renewal and replacement obligation. If the renewal and replacement obligation is greater than the anticipated Communications Worker revenue, this amount becomes the Public Computer Facility Support fee for that particular lab.
6. C&C is proposing that this amount be calculated once a year (at the beginning of the year) and that the total fee be posted to the general ledger annually or perhaps quarterly. C&C will not recalculate the fee during the year as port and Communications Worker counts change.

Public Computer Facility Support Fee, Guidelines for Implementation:

It is not appropriate (indeed, it would not be possible) to calculate and assess a Computer Support Fee for all campus computer labs. The following notes discuss the guidelines used to determine which campus computer facilities should be assessed the support fee:

1. Non-Public Computer Facilities Associated with a Specific Academic Program. These computer labs (located throughout the campus and across academic programs) are typically much smaller than public facilities and serve the needs of a focused, known group of users (these labs are not available for general student access). In general, it is assumed that the Communications Worker fees generated from these labs (from PIs, post docs, graduate researchers, undergraduate assistants, etc.) are sufficient to recover the renewal and replacement and network operating costs associated with the facility.

2. Large, Public Computer Facilities Associated with Service and Auxiliary Enterprises. Although the campus does not currently maintain any of these types of facilities, C&C anticipates that these labs may become much more pervasive in the years ahead. For example, the Commons expansion may create 100s (if not 1,000s) of computer ports with virtually no revenue offset from Communications Worker fees. When these labs are under development, C&C will contact the campus organization in question and develop a network acquisition and support plan. The network support plan may involve the Public Computer Facility Support fee, as well as other provisions depending on the nature of the network and the needs of the organization. These agreements will be summarized in a Memo of Understanding (MOU) similar to the documents in place supporting UCR’s agreements with Grand Mark, International Village, and Stonehaven.

3. Large, Public Computer Facilities Not Associated with a Specific Academic Program. C&C has identified two organizations whose Communications Worker fees will not offset the network electronics renewal and replacement budget associated with maintaining the computer facilities. These entities are the Library and C&C’s Student Computing Support unit. Per the methodology outlined earlier, C&C has calculated Public Computer Support Facility fees for these two organizations and they are included in the Communications Rate Schedule.

Rates for “Distant” Voice and Network Access (e.g. Heckman, CE-CERT):

UCR currently provides (and more frequently in the years ahead will provide) voice and data support to campus entities that are not directly connected to the campus core network. In most cases, these organizations are located off campus and receive their voice services from Pacific Bell (*). Again, C&C anticipates that the number of these customers will increase in the future. Moreover, as converged networks become a reality, these customers will obtain voice services via UCR’s data network.

In the same way that new campus buildings must fund network electronics and inside cable plant costs, new off campus buildings (e.g. the Heckman Center) will be expected to fund these cost as well. C&C will partner with organizations responsible for off campus construction and guide communications infrastructure deployment utilizing the Interim Communications Planning Standards Document.

Moreover, all off campus customers will be expected to fund the capital costs associated with “distant” voice and data network access as well as the monthly recurring (operating) costs related to this network access (importantly, this is true of BOTH voice and data access). For example, to connect the Heckman center to the
campus network, certain capital costs may be incurred (trenching from a fiber distribution location to the building). Once these capital costs are incurred, a monthly fee may be required to enable service (e.g. renting “dark fiber”, provisioning of bandwidth from a third party, etc.). Again, off campus customers are solely responsible for these costs.

* Off campus entities may elect NOT to acquire UCR voice services. However, if the organization wishes to directly connect to UCR’s voice network, the entity is solely responsible for funding the capital and operating costs associated with “distant” (remote) off campus voice service. All voice electronics and infrastructure will be built out to UCR’s specifications.

Organizations that do not Participate in PPS (e.g. Federal Salinity Lab):

UCR provides voice and data services to a limited number of non-campus organizations when such access provides compelling, mutual benefits to both entities and when such services do not violate any campus or UC acceptable use policies. Obviously, these non-campus organizations do not participate in the campus payroll personnel system.

If an organization does not participate in PPS but desires access to UCR’s network (and access is granted), C&C will bill the entity (at the beginning of the year) the Communications Worker fee multiplied by a negotiated number of active network ports (multiplied by the number of months). For example, the federal Salinity Lab (located just south of the Botanic Gardens) is connected to UCR network, but does not utilize UCR payroll system (and C&C therefore cannot determine the number of Communications Workers by title code). The Salinity lab would therefore be billed the Communications Workers fee multiplied by a negotiated number of network ports. Removal or addition of network ports will be supported throughout the year at no additional charge (there is currently no robust technology available which identifies active network ports).
Critical Issues and Significant FY 02/03 Budgetary Changes

Communications will face several significant issues during FY 02/03 and their impact can be found throughout the attached budgetary documents. These issues fall into the following categories:

1. Staffing.
2. Replacement of UCR’s Telephone Switch.
3. Inclusion of Outside Cable Plant Costs in Communications Budget.

Staffing.

In the years ahead, UCR’s growth will impact the campus in many ways. Certainly one manifestation of this growth is the increase in large to voice & data installations as well as increased requests for complex “moves, adds, and changes” (including entire departmental moves as new buildings are occupied and “renovated/remodeled” space is made available for other purposes). During the next five years, C&C does not anticipate any decrease whatsoever in the number of new installations or requests for “adds, moves, and changes”. Moreover, increasingly complex and varied technologies (e.g. wireless networking) simply add to the workload and demand for timely service.

In order to provide quality, timely, and reliable services to a growing customer base, C&C is proposing hiring three full time equivalents in the fourth quarter of FY02/03 (April through May 2003) and one full time position during FY03/04. These FTE will enable Communications to meet demands for voice and data services (specifically related to new installations and “adds, moves, and changes”) during the next four fiscal years. Proposed additional positions for fiscal years 02/03 and 03/04 are described below.

Service Coordinator and Facilitator / Project Manager. Currently, project management relating to major new installations and large “adds, moves, and changes” is performed by Communications staff who are not formally responsible for this work. Given the technical complexity of these efforts, this lack of formal facilitation often results in frustrated customers and technical staff (all of whom are working hard but suffer from a lack of communications and coordination). Project management and service coordination will yield very tangible benefits and C&C believes the campus is VERY willing to fund a position that will directly facilitate large and complex installations and “adds, moves, and changes.” Again, for FY02/03, C&C is requesting .25 FTE on a temporary basis and 1.0 FTE on a permanent basis during FY 03/04.

Senior Electronics Voice and Data Technician. During the past several years, Communications has utilized casual technicians to meet campus demand for new building installations as well adds, moves, and changes. Currently, Communications employs 5 electronic technicians as well as one lead. This team handles over 19,000 annual service requests. Since two full time technicians are required to service the phone switch itself, the sheer volume of work requires MORE than 3 “outside” FTE to adequately meet departmental demand (thus forcing Communications to utilize casual help). This additional FTE will not only allow Communications to forego hiring casual assistance, but the permanent addition will provide for a more productive, effective work force. For FY02/03, C&C is requesting .25 FTE on a temporary basis and 1.0 FTE on a permanent basis during FY 03/04.

Call Center / Call Conferencing / Vendor Coordinator. Similar to the expenditures for casual technicians mentioned earlier, Communications has, for many years, hired casual help to assist with operator functions, call center and call conferencing facilitation, and with vendor invoicing and campus billing support. During the past several years, casual assistance in these areas has been satisfactory. However, given campus growth
and the implementation of a new switch (with additional features and functionality including the implementation of the UCR (827) prefix), a permanent position will shortly be required. For FY02/03, C&C is requesting .25 FTE on a temporary basis and 1.0 FTE on a permanent basis during FY 03/04.

Network Operations Manager. For 3½ years, the individual who has managed Network Operations has also performed the duties of systems administrator for the campus e-mail (and other) servers. Albeit with a great deal of stress and last minute trouble-shooting, this combination of positions has met campus needs. However, the increasing complexity of the campus network and the pending upgrade of the campus e-mail system make the current situation no longer tenable. Both areas are of such complexity and campus importance that an FTE must to allocated to each task. The proposal is for 1.0 FTE on a permanent basis during FY 03/04.

Replacement of UCR’s Telephone Switch.

During the current fiscal year (01/02), C&C has evaluated several technical alternatives relating to replacing the GTE 4600. This evaluation was made with the following three issues as background:

1. UCR has requested that the vendor supply a very robust and flexible suite of instruments (vendor instruments should include low cost digital single-button instruments that are feature rich, multi-button digital instruments that are feature rich, and Voice over IP phones). This instrument requirement resulted in a failed phone switch RFP in late November.

2. UCR is also seeking the greatest degree of flexibility possible relating to Voice over IP technology. Simply stated, whatever decision the campus makes in the short-term, it should be made with the goal of future flexibility relating to implementing emerging technologies (especially Voice over IP).

3. C&C recently ranked the challenges facing the campus resulting from the 4600 phone switch. Clearly, the two most pressing problems are CAPACITY and RELIABILITY. The 4600 has been at maximum trunk capacity for two years, and is nearly at capacity relating to lines (that is, available numbers). The inability to add trunks (connections to the public voice network and to remote Mitel switches) is resulting in an increasing level of “fast busys” when campus users attempt to place or receive calls. The lack of telephone numbers will become critical as new buildings are brought up in the months and years ahead. Concerning reliability, the campus has already suffered a two-day complete loss of voice service due to a 4600 failure. Moreover, Communications is rapidly running out of replacement line cards. These cards connect an instrument to the switch and are failing at a rate of approximately one per month. Communications currently has no line card suppliers.

Given the requirements for technical flexibility, C&C has decided to pursue a phone switch replacement strategy that ONLY addresses the most pressing challenges associated with the aging 4600 (again, capacity and reliability). C&C will address these issues by replacing the 4600 with a modern, IP enabled phone switch. However, to retain flexibility in future years, C&C will NOT REPLACE ANY INSTRUMENTS, VOICE MAIL SYSTEMS, OR MITEL REMOTE PBXs. This solution (costing approximately $1.2 million) will allow C&C to solve the most immediate voice problems facing the campus. However, by NOT replacing campus instruments or other voice systems, C&C will reserve flexibility to meet future campus voice needs WITH THE MOST APPROPRIATE TECHNOLOGY AVAILABLE AT anticpates THE TIME. For example, once the new switch is implemented, C&C could meet new building voice needs via a traditional digital phone solution, via a Voice over IP solution supplied by the switch vendor, or via a Voice over IP solution supplied by another vendor (e.g., Cisco).

C&C is proposing replacing the current phone switch just prior to the beginning of FY 02/03. C&C an annual payment of approximately $281,790 ($1,127,163 financed at 6.125% over 4 years). Maintenance fees will cost approximately $128,000 per year. Communications has budgeted $733,996 annually for FUTURE year voice infrastructure renewal and replacement. This will permit Communications, in time, to replace the
campus Merlin and Mitel systems, to replace the campus voice mail system, to meet new building needs, and to introduce new voice features to the campus. Again, this methodology will allow C&C to consider and adopt emerging technologies as they become robust, reliable, and affordable.

A document detailing this “staged” phone switch replacement is available upon request.

**Inclusion of Outside Cable Plant Costs in Communications Budget.**

Historically, capital projects (for new building construction and major remodels) have included funding for outside cable plant, inside cable plant, and network electronics (voice electronics and instruments have always been funded by Communications). After extensive meetings with AP&B and Design and Construction, a decision has been reached to change this funding model. Communications will now INCLUDE the costs of new building outside cable plant in its budget (the costs may consist of trenching, conduit, Air Blown Fiber Tubing, and Air Blown Fiber). Network electronics and inside cable plant (per the specifications contained in the Interim Communications Planning Standards Document) will continue to be funded via the capital project’s budget. The new outside cable plant costs will be recovered via campus line charges. As a note, voice electronics supporting new buildings have always been included in the line charges and the costs of new instruments have been recovered via instrument fees.

C&C’s anticipated costs (associated with outside cable plant) are expected to be significant over the next several years—obviously due to the new building construction. Tables in this document illustrate the annual costs associated with these cable plant deployments (C&C will finance this cable plant over 15 years due to the long life span of trenching, fiber, and conduit).

**Data Network Renewal and Replacement Plan.**

C&C has historically not renewed and replaced the campus data network in a stable, predictable fashion. This document contains a very detailed proposal for data network renewal and replacement (included in this plan are core network electronics, building electronics, internet access, fiber, building copper, etc). The annual cost is $1,451,253. Due to the significant annual cost (and the fact that much of UCR’s network has already been upgraded during the past 4 years), C&C is proposing implementing the network renewal and replacement plan incrementally; 30% of the total budget will be expensed in FY02/03, 60% in FY03/04, and 100% in FY04/05 and beyond.
Services, Rates, and Cost Accounting Justification

During the past year, Communications has completely and thoroughly reviewed its operation and has identified six voice lines of business and two data lines of business. All expenditures (be they hardware, software, or human capital) have been allocated to these lines of business. As background for this effort, this document contains the following:

- Justification for staffing allocations, voice and data.
- Voice expense allocations (salaries and S&E) across voice lines of business.
- Justification for voice expenditures.
- Justification for data network expenditures.

Communications provides several general campus services that are not supported by specific rates. Examples of these services include the following:

- E-911 Access (direct connection with campus Police and Riverside PD).
- Coordination of Local White/Yellow Pages Advertisements.
- Consulting and Infrastructure Planning (especially relating to new buildings and major remodels).
- On and Off Campus Directory Assistance.
- Emergency Telephones (includes elevator phones, fire alarm lines, emergency phones, and escort phones).

Notes Relating to Voice and Data Rates.

Communications supports six voice lines of business and has developed rates relating to these lines of business. These lines of business are as follows:

- **Basic Service.** This line of business provides dial tone, and users are charged on a “per line” basis. Unlike previous years, the Basic Service line of business is NO LONGER burdened with data network costs.

- **Instruments.** This line of business provides users with phones as well as instrument maintenance, programming, and support. Users are charged on a per instrument basis.

- **Labor.** This line of business provides users with technical services supporting voice and data “adds, moves, and changes”. Please note that all technical maintenance/support is INCLUDED in either the Basic Service or Instruments lines of business. Users are charged on an hourly basis.

- **Tolls.** This line of business provides users with the capability to place toll calls. Users are charged the cost of the call as well as an appropriate mark up for overhead. Unlike previous years, the Tolls line of business is NO LONGER burdened with data network costs.

- **Auxiliary Services.** This line of business provides users with voice mail and auto attendant service. Users are charged on a per voice mailbox basis and a per auto attendant class of service basis.
- **Administrative Processing Fee.** This line of business provides the campus with administrative support for communications “pass through” billing (many communications vendors will NOT invoice the campus on a department-by-department basis; examples include cell phone bills, measured business lines, etc). Also included are communications sundry debtor bills. Users are charged the actual vendor cost of the service plus the administrative processing fee.

In addition to providing the services notes above, Communications provides campus Police with paging services. The current rate is $40.00 per month (negotiated between Communications and Police).

Communications also supports two data lines of business, the Communications Worker and the Student Communication user. These lines of business have been discussed at length earlier in this document.

**Cost Accounting Methodology.**

As indicated in the preceding paragraphs, ALL expenditures for Communications Services (activity A01377) and Network Operations (A01378) were reviewed to determine the appropriate amount to allocate to each activity (again, the exercise was performed for salaries, benefits, and all S&E). Once expenditure amounts were identified by activity (voice versus data), expenses were allocated across voice and data lines of business. This process resulted in a “required recovery amount” by line of business.

The required recovery amount was then applied to the estimated number of customers for each service offered within the lines of business. C&C engaged in much internal debate relating to the most appropriate cost accounting drivers for each service. C&C then sponsored a discussion of these methodologies with staff from Internal Audit and Academic Planning & Budget. The methodologies outlined below were determined to be both sound and reasonable.

**Voice Services**

<table>
<thead>
<tr>
<th>Line of Business</th>
<th>Cost Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Service</td>
<td>Number of active lines; 20% reduction for extensions (extensions are dial tone WITHOUT a unique number) *</td>
</tr>
<tr>
<td>Labor</td>
<td>Available technician hours</td>
</tr>
<tr>
<td>Instruments</td>
<td>Number of estimated instruments weighted by Communications technicians’ trouble ticket effort and the cost of each item **</td>
</tr>
<tr>
<td>Tolls</td>
<td>Number of tolls minutes by call type ***</td>
</tr>
<tr>
<td>Auxiliary Services</td>
<td>Number of active voice mail boxes and number of active auto attendant classes of service</td>
</tr>
<tr>
<td>Administrative Processing Fee</td>
<td>Number of documents (“bills”) processed</td>
</tr>
</tbody>
</table>

Notes:

* Communications will no longer charge multi-line fees. There is simply no cost accounting justification for this rate. Moreover, line and extension fees will no longer be burdened to recover network costs.

** This is a new instrument methodology and “weights” rates based on the effort of maintaining the various campus instruments.

*** This is a new methodology for tolls. Tolls will be charged on a standard per minute rate (by call type) and will not be burdened to recover network costs.
As noted throughout this document, Communication Workers are identified by payroll title code. C&C has investigated two options for calculating Communications Worker counts by UCRFS Activity Code. The following notes briefly discuss these two alternatives.

1. **Headcount.** The first alternative simply counts the number of employees, by title code, within each activity (there is no concern for percent effort). For example, an employee who works 40% for Biology and 40% for Entomology results in a .50 Communications Worker for each activity.

2. **FTE.** The second alternative counts FTE by activity (taking into consideration the percent effort). The employee who works 40% for Biology and 40% for Entomology results in a .40 Communications Worker for each activity. The “FTEness” of hourly employees is the ratio of hours worked to total available hours on a monthly basis.

Both options were thoroughly examined as part of the rate development process (this analysis included input from Internal Audit, AP&B, and others). It has been determined that the second alternative (determining the count of Communications Worker by FTE) is the most equitable and C&C has therefore calculated the campus count of Communications Workers utilizing this alternative.

As a final note, undergraduate student employees have been included as Communication Workers. For students employed via work-study funds, campus departments (employing the student) will be assessed the Communications Worker fee.