WRITTEN STATEMENT OF
SUSAN CRAWFORD, PROFESSOR, CARDOZO LAW SCHOOL

HEARING ON:
APPLICATIONS OF AT&T, INC. AND DEUTSCHE TELECOM FOR CONSENT TO ASSIGN OR TRANSFER CONTROL OF LICENSES AND AUTHORIZATIONS BEFORE THE CALIFORNIA PUBLIC UTILITIES COMMISSION

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Thank you for inviting me to testify. It is an honor for me to be here.

By way of background, I practiced law for 13 years in Los Angeles and Washington D.C., working with Internet-related companies. In January of 2003, I left WilmerHale and began my current job as a professor of law, teaching communications law and Internet law. I was a member of the board of the Internet Corporation for Assigned Names and Numbers from 2005 through 2008. In the fall of 2008, while I was a professor at the University of Michigan Law School, I took a leave to co-lead the FCC transition for the Obama administration and then to serve as Special Assistant to the President for Science, Technology, and Innovation Policy for 2009. In the fall of 2010, I returned to Cardozo Law School, and for 2012 I will be a Visiting Professor at Harvard's Kennedy School and a Fellow at Harvard Law School.

Cardozo and Santa Clara are sharing the expense of my travel here. I have been careful since I left government not to take on any clients or consulting arrangements.

I understand that the principal reason you have asked me to come before you today is to discuss the relationship between the proposed merger between AT&T and T-Mobile and innovation. The question is whether the proposed combination will have positive or negative effects on innovation throughout the wireless ecosystem in America.

I think there are three key points to keep in mind:

• First, that the suggested merger sheds light on the fact that we are heading towards - and may already have - a duopoly in the market for wireless access, with a yawning, insurmountable gap between the two big wireless carriers and everyone else;

• Second, that there are insufficient protections in place for innovation in connection with these wireless networks, and if this merger is permitted to proceed, the resulting unregulated duopoly will have ample incentive and ability to keep profit margins as high as possible by discriminating against uses and services these companies believe are undermining their business plans. The mere threat of this discrimination will cast a cloud over investment in new ideas and new ways of making a living for all Americans, and particularly for California's entrepreneurs;

• Third, that California should take the opportunity of the merger to consider what enforceable concessions AT&T could be required to make as a condition of its privilege to continue providing services to Californians, who are among America's most innovative citizens.

Society reaps increasing economic returns from the existence of ubiquitous high-speed communications infrastructure, and it is appropriate to incentivize and support the creation of this infrastructure. But those social returns come because the benefits of ubiquitous, general-purpose, nondiscriminatory communications infrastructure spill over to all of us, not just to a few large companies. The complete discretion already enjoyed by AT&T and Verizon to capture economic rents and choose winners and losers from among the companies that use their networks to launch businesses of their own - and to raise their prices and set the terms and locations of their services at will - means that their private incentives are already not necessarily aligned with California's social incentives. The merger between AT&T and T-Mobile will further solidify this duopoly, and will remove from the field a challenger that was providing an open platform to application developers, offering lower-price options for consumers, and taking on the duopoly in the policy realm in Washington. And it will not necessarily result in greater investment in

infrastructure, capacity, or innovation by AT&T; indeed, as in the merger between Comcast and NBCU approved earlier this year, it is difficult to identify the public interest benefits of the combination.

I will discuss each of these three points briefly but first want to put the merger's potential effect on California into context.

The Context for the AT&T/T-Mobile Merger

We have had a highly-concentrated market in wireless transmission for some time at the national level, and the merger would increase that concentration. It would give AT&T and Verizon, together, somewhere between 76% (all retail subscribers) and 82% (post-paid) of wireless subscribers nationwide and would increase Herfindahl Hirschman Index (HHI) levels to 3198, far above the 2500 level that DOJ/FTC consider to be highly concentrated.

AT&T has argued strongly that the relevant markets are local, and that there is plenty of competition in local markets because Metro PCS, Leap, US Cellular, and the (not-yet-operating and apparently doomed) LightSquared are also present. This is like asserting that my former hometown of Washington, DC has several football teams: the Redskins, the Georgetown University team, and the Gonzaga High School team. It's strange to say that the last two are substitutable for the first. AT&T and Verizon provide reliable nationwide service without extra roaming charges; the pre-paid players offer only unsubsidized handsets, routinely impose roaming charges, have puny data plans, and reach a much less affluent segment of the American public.

Nonetheless, even taking AT&T at its word, and ignoring the fact that AT&T runs its business on a standardized national basis, three of the country's largest 50 "Economic Areas" in California are already highly-concentrated, even absent the merger: Los Angeles/Riverside/Orange County, the second-largest EA, had a 2008 HHI of 2488; San Francisco/Oakland/San Jose, the fifth-largest, had a 2008 HHI of 2610; and

Sacramento/Yolo, the twenty-seventh largest, had a 2008 HHI of 2621. In all three of these local markets, AT&T's *existing*, pre-merger spectrum holdings already exceed the FCC's trigger for close examination (its "spectrum screen").

These companies have become consolidated for very good reasons. Wireless is a high-fixed-cost business; it costs a great deal to install towers, feed them with wires (and update those wires to fiber), and buy spectrum. Indeed, wireless access service has all the hallmarks of a natural monopoly, with its high up-front costs, sharply declining costs to add additional subscribers, and barriers to entry in the form of tower-siting approvals and licenses to use spectrum. Very few companies are able to achieve the scale necessary to make a go of it, and so they routinely combine rather than compete.

When the cellular phone emerged as a consumer product in the 1980s, it operated in 800 MHz frequencies, for which the FCC initially gave away two licenses for 40 MHz of spectrum in each of the 306 market areas in the United States - one to a wireless provider and one to a wired provider. Small-market licenses frustrated the buildup of viable nationwide wireless infrastructure; companies in urban areas only had a few voice channels, which wasn't enough capacity to serve demand, and companies in rural areas couldn't produce enough revenue to survive. No one could operate at the scale needed to make the business worthwhile.

The 1980s licensing process led, predictably, to quick consolidation and market-division agreements among the applicants. This desirable "beachfront" low-frequency spectrum went to the corporate ancestors of today's AT&T and Verizon. It represents a significant windfall advantage to these companies that cannot be replicated by Sprint or T-Mobile, much less the pre-paid providers; there is, as a result, an enormous gap between AT&T and Verizon, on the one hand, and everyone else, on the other, in terms of subscribers, revenues, margins, and free cash flow.

This gap only increased following the FCC's 2008 700 MHz auction, for which no spectrum caps were imposed. AT&T and Verizon collectively accounted for more than

four-fifths of the auction proceeds, spending almost $20 billion; because it was clear to T-Mobile that the foreclosure value to the two giants of keeping a new competitor out of the arena would exceed any reasonable market value for this spectrum, and because the giants weren't barred from the game even though they already had enormous holdings in desirable "beachfront" low-frequency spectrum, T-Mobile didn't even enter the 700 MHz auction.

I want to underscore the importance of T-Mobile's inability to get access to "beachfront" lower frequencies. Data rates go up with T-Mobile's higher frequencies (1900 MHz PCS band, 1700-2100 MHz AWS band), but the distance data can travel goes down. So when you get into the gigahertz bands, which is where T-Mobile is today, you can indeed carry gigabits of information, but you might have to have cell towers at an impossible every 100 yards in order to do that. (This explains why Wi-Fi (high-frequency) speeds are faster than commercial wireless speeds but travel only short distances.) This means that a carrier with "better" (lower) spectrum can build fewer base stations, which is a major cost advantage. These spectrum issues have created a yawning gap between T-Mobile (and Sprint) and the two big wireless carriers, with their broad, unchallenged holdings in the 700 MHz and 850 MHz bands.

Nonetheless, T-Mobile's management told investors in January 2011 that the company was "a very good asset" that was generating positive annual free cash flow of between $2.5 billion and $3 billion a year, with a strong network architecture in which half its towers were already fed by fiber, with terrific smartphones, the best value proposition for consumers, great customer service, and with higher (and growing) margin on revenue than Sprint. Why the optimism? Management also said during that same call: "We're absolutely positive and optimistic about [the] commercial option in [the 700 MHz] D block." ("T-Mobile Investor Day - Transcript," Jan. 20, 2011.) When the Administration appeared to take the possibility of auction for commercial use of the 700 MHz D Block off the table not long ago, Deutsche Telecom apparently could not see a path forward and decided a merger was the best route.

So California is already home to highly-concentrated local markets for wireless access. I do not believe that Metro PCS, Leap, or any of the other pre-paid carriers exercise any pricing or service discipline on AT&T.

I also suspect, given my observation of the cable industry, that Verizon Wireless and AT&T tacitly divide the market in California for *wired* services that they provide ("you take Sacramento, I'll take LA") and for the provision of backhaul middle-mile links to one another. I urge you to look into this matter; 95% of any wireless network is made up of wires, and Politico reported in late June that the independent backhaul business is threatened by an alleged reciprocal arrangement between AT&T and Verizon to provide infrastructure to connect each other's wireless data traffic. ("AT&T-Verizon Pact Alarms Backhaul Provider," June 21, 2011.) It is beyond question that Verizon and AT&T are in a position to tacitly collude, divide markets, and protect their joint interest in pricing power over wireless services.

We Face A Duopoly for Wireless Services

This is a business that requires operating at scale in order to survive and thrive. Right now, only Verizon and AT&T have real scale in wireless. The suggested merger sheds light on the fact that we will have a duopoly in the market for wireless access, even if the merger itself never happens.

Let me explain. Even though most of AT&T's and Verizon's assets are actually *wires*, not *wireless* connections, both companies are losing money hand-over-fist on the wired side of their businesses. Pokey DSL high-speed Internet access, which operates over traditional copper phone wires, cannot compete with the cable distributors' DOCSIS 3.0 connections; the differential is arguably more than Redskins v. Gonzaga High - it's akin to rushing river v. water fountain. Wall Street investors can't stand the long-term nature of the investments necessary for these telephone companies to install new fiber networks that would compete with DOCSIS 3.0, and so the telcos have dramatically backed off on these investments. Cable snaps up 90% of all new wired broadband subscribers these

days; Americans love cable's high-speed wired connections, and new high-data applications are continuing to drive this love affair.

This merger comes before you at a time in which Americans are thirsty for high-data-rate applications. The mobile world - in which communications operate in a harsh world of interference and degrade sharply over distance - cannot compete with the wired world when it comes to data transmission. Each "wire" in a wireless network (each tower) has to serve 436 times as many homes as a cable network, which serves one home at a time; each wireless network spot has 1/37th the capacity as a cable wire; and there is vanishingly low interference inside a cable network.

So AT&T and Verizon have no choice but to focus entirely on the separate world of wireless, where they are still wringing out some profits. But they face enormous threats on the wireless side as well. Their margins for *voice* services are ten times higher than their margins for *data* services, but Americans love data services and data usage is skyrocketing. AT&T and Verizon have every incentive to ensure that their wireless operations keep data usage as low as possible for as long as possible by managing scarcity: imposing usage-based billing and avoiding installing fiber to their towers wherever they respectably can.

Usage-based billing allows AT&T and Verizon to reduce the attractiveness of potentially competing data services and other nonaffiliated products crossing their wireless networks; consumers won't want to use competing services, even if they technically can, because they'll be subject to large overage charges, cut-off of service, or other remedies imposed within the carrier's discretion.

Avoiding capital-intensive fiber installations where possible will both please investors and continue to shape users' expectations; we'll be used to relatively slow, crippled, heavily-curated and compressed mobile services as the status quo.

Adoption of the LTE protocol will give AT&T and Verizon enhanced technical ability to charge premiums for their own or affiliated products and afford them "Quality of Service" treatment; LTE is a protocol that is optimized on billing.

All of this is rational; it is done in the service of keeping margins as high as possible so as to please Wall Street.

AT&T's choice to merge with T-Mobile makes sense; it is trying to force a natural monopoly, utility communications service (like water and electricity), with its extraordinarily high upfront costs and sharply declining cost curves, into a private, profit-making, Wall-Street-attractive service, and the only way to do that is to continue to scale, tightly ration capacity, price-discriminate, keep capital costs down, and eliminate competitive ideas - like the low-priced services, open development platforms, and policy positions pushed by T-Mobile in DC - that would undermine this mindset. Folding in T-Mobile holds the potential for AT&T to add subscribers without adding to its employee headcount, and may permit it to possibly lower its ratio of employees to subscribers.

By the way, AT&T says that it needs to merge in order to address the flood of data across its network, but even *doubling* the available spectrum for wireless broadband wouldn't change the laws of physics - we'd be out of capacity again in a year or so if usage growth isn't stemmed. So the only way for AT&T and Verizon to keep on top of the situation is to maintain the market power that makes rationing the new normal for all American consumers.

All of this is to make one simple point: AT&T and Verizon's top priority must be to maintain and enhance their scale advantages and market power in the separate world of mobile communications in order to keep their margins high and please investors, and this merger serves that end.

The Duopoly Threatens Innovation

The future question for California, as it is for the FCC, is what regulatory environment will make sense given the utility, natural-monopoly nature of wireless transmission services. Someone is bound to notice that these actors are trying to pretend they are media companies when, in fact, they are more frequently seen by Americans as basic transport providers; what they are providing is access to the Internet.

The Internet Changes Everything. Let's spell this out a bit. We used to assume that there was a necessary association between a particular form of infrastructure (like telephone and cable wires) and a particular functional capacity. So we assumed that each wire could do only one thing, and we had to have a separate network for each thing we wanted to do. This led to business models where a network owner was also the provider of whatever particular service—phone, cable, etc.—was carried over that particular kind of wire.

The Internet has completely overturned that assumption. The Internet is best understood as a collective agreement to use a particular language (the Internet Protocol) when connecting computing machines to telephone, fiber, and cable lines that are interconnected around the world. The innovation of this language was to allow computers or other devices connected to the Internet (including wireless handsets, televisions, fax machines, and TiVOs) to send and receive information of any kind via data streams over many different types of physical wires or fibers or wireless transmissions. The Internet Protocol can run over anything. And any different use (phone calls, television, news) can be communicated over the Internet Protocol. These uses may be provided by the network infrastructure owners, or they may be provided by other people (including any one of us). Phone services can come from Skype—over the Internet. Video on demand can come from Amazon's online movie rental store. Television shows can come directly from the servers of users. And so on.

"The Internet" is thus not the same thing as Verizon's or AT&T's lines, fibers, or wireless connections. Though that infrastructure is important, these actors are merely providing one set of connections that allow users and businesses to connect to the constant, dynamic, decentralized interaction and communication using data that the Internet Protocol facilitates.

The Internet threatens vertically-integrated private carriers seeking high returns. Now, the Internet is taking over the functions of all of the communications networks we used to have. *Each of the vertically-integrated network access providers in this country sees this change as a threat.* AT&T and Verizon offer their own television services, music services, and premium content. The open Internet is the greatest competitor they have ever seen—precisely because it is not one competitor, but a general-purpose vehicle for thousands of entrepreneurs across the country, and most particularly in California, to offer innovative new products.

As things stand now, both of these dominant network access wireless providers has the freedom to act as an editor or gatekeeper for its own commercial purposes. They would like their services to be much more like cable programming than general-purpose communications—edited and constricted communications offerings. AT&T and Verizon have succeeded in persuading federal regulators that they should not be treated as communications providers, and see the future potential for vertically-integrated services that they control and monetize. They have a giant built-in conflict of interest.

Verizon and AT&T are fans of the cable distribution model. Although they've lost the battle on the wired side of their businesses to the cable companies, Verizon and AT&T are admirers of the cable distribution business model and the tens of billions of dollars it throws off in fees each year to programmers and distributors alike. The major Internet companies that support this merger (Microsoft, Facebook, Qualcomm, Oracle, Yahoo!, Avaya, Brocade, venture capital firms Kleiner Perkins Caufield & Byers and Sequoia Partners, and BlackBerry maker Research in Motion) are also fans of this model. You can think of Facebook as the ESPN of the wireless world: It's an addictive, must-

have channel that has deep exclusive relationships with its audience and the power to command prime, first-tier fees and placement from the distributors. AT&T needs Facebook, just as Time Warner Cable needs ESPN.

In this model, both programmers and distributors win. One loser is the consumer, who faces ever-increasing costs and homogenized choices that have been edited by a powerful distributor; another loser is the innovator - independent channels that don't want to pay the freight to the distributor or otherwise meet whatever arbitrary conditions the dominant carrier imposes don't get carried. (Notice that Al Jazeera can topple authoritarian regimes but cannot get carried by Comcast.) Facebook could not have been born absent the regulatory regime that allowed for introduction of online applications without the permission of communications carriers; now that Facebook has achieved massive scale, it is willing to shut the door of innovation behind it.

To make the whole thing work, you need gatekeeper control at the distribution level so that price increases can be forced down, services can be tiered and channeled and charged-for reliably, and consumer expectations of an expensive, bundled service can be set and maintained. This merger, backed by a $20 billion non-recourse loan from JP Morgan, ensures that AT&T's strength as a wireless distributor will stay in place.

The problem for America presented by deregulation in both the wired and the wireless worlds is that the increasing returns made possible by ubiquitous Internet access will be captured in the form of revenues that will go only in the pockets of a few very large companies. That kind of spillover won't necessarily serve all of our interests. What we should want, instead, are increasing returns for society as a whole. Increasing returns for all Americans will be prompted by new ideas and new ways of making a living. Those ideas, in turn, will be facilitated by widespread, open, ubiquitous Internet access, which has been and will continue to be a playground for innovation unlike any the world has ever seen.

Instead, we have handed to the carriers the ability to decide what innovations make sense for America. We have created through deregulation a context for communications that is the equivalent of the "orderly marketplace" beloved of the early 20th-Century trusts and combinations.

The lack of network-operator competition we currently have, and the concomitant control the operators have, provides the opportunity for discrimination and gatekeeping on a mammoth scale when it comes to new data applications, new uses of these networks, and new devices. After-the-fact rationalizations for "management" of these networks ("discrimination" using a more neutral name) are so easy to craft. The real danger to innovation is the pervasive threat inherent in the ability to "manage." An application developer unwilling to "partner" with the carrier cannot attract investment, because the network provider may degrade the functionality of the application at any time – imagine a highway designed to favor only particular kinds of cars at particular moments, and then imagine the frustration of an auto entrepreneur with a new kind of design ready for funding. Arbitrariness, by itself, is enormously threatening to innovation. The risk to American innovation is that almost anything – including discrimination for commercial reasons as well as viewpoint-related reasons – can fit within "reasonable network management."

Because the AT&T/T-Mobile merger will solidify AT&T's and Verizon's ability to dictate the business model for wireless communications in America, and will ensure AT&T's continued ability to decide what "programming" it "carries," what devices it permits to attach to its networks, and on what conditions, it will enhance the arbitrariness of the mobile platform as an innovation ecosystem in America. That can't be good for the development of the new ideas and new ways of making a living that our country needs so much.

California Should Exact Conditions

AT&T has demonstrated over time that it is very good at getting its proposed mergers approved. It can, today, make promises aimed at helping solve seemingly intractable policy issues confronted by the FCC, including fixing intercarrier compensation and Universal Service funding, assisting public safety with their communications needs, and raising adoption numbers for (relatively slow) Internet access in rural areas.

Your charge, I would think, is to ensure that the regulatory environment in California delivers cost-efficient, timely and cutting-edge telecommunications services on an ongoing, fair and equitable basis to all existing and potential users in California. You may want to consider what promises you'd like to see AT&T make that would concretely serve these social interests. And you may want to consider the toughest possible mechanisms to ensure those promises are adhered to. Promises made in the context of merger discussions often, in the end, don't stick for a host of reasons.

For example, AT&T may be promising you and your governor that it will make substantial investments in California if the merger is approved. But one condition of the deal is that AT&T will send $25 billion to Deutsche Telekom in Germany, where it will predictably be spent on share buy-backs and reduction of DT's debt, not on building US network infrastructure. (AT&T is itself interested in share buy-backs that its investors will like: Between 2006 and mid 2008 AT&T spent $18.8 billion on repurchasing its shares.) Because it is very difficult for outsiders to tell whether investments have or have not actually been made, and for what purposes, these investment promises are difficult to enforce.

And, as the New Zealand's Telecommunications Commissioner, Dr. Ross Patterson, said in a speech in Wellington on May 19, 2011:

> Although incumbents in all jurisdictions have, during regulatory processes, made the investment boycott threat – if you regulate we will cease investment- the reality is that the incumbent is forced to invest

> (often unwillingly) in response to competitive pressure. A regulatory regime which promotes competition stimulates investment.

The problem is that California cannot, I believe, by itself create that necessary regulatory regime in America.

I have four ideas for you.

First, AT&T has recently brought free wireless access to NYC city parks. This can't have been easy for them to do; my current hometown's bureaucracy is impressive. But they did it. Perhaps California could require that free highest-speed-possible (read: many fiber-fed cell towers) wireless access be provided in perpetuity throughout California's major cities. Taipei and Hong Kong have free wireless access; why shouldn't the home of digital innovation in America have it as well?

Second, the BTOP grants program run by NTIA within the Department of Commerce is making investments aimed at ensuring that the country has examples of installations of open fiber to "anchor institutions" (schools, libraries, hospitals, community centers) to which any local last-mile provider can connect on reasonable terms. AT&T no doubt controls ample fiber within the state; you could require that it wire these anchors and open those connections on standard, reasonable terms to anyone who asks. You would need to provide unambiguous and enforceable deadlines and benchmarks; a strong, non-leaky written right to be connected; strong guidance on the terms on which such interconnection is to be granted; and be ready to step in quickly to resolve disputes if it should prove impossible for the parties to reach agreement. The spillover effects for communities in California that are served by these anchors would be dramatic.

Third, you should consider enlisting AT&T's concrete aid in the building of community-owned fiber networks throughout California, and should yourselves encourage the creation of these networks. The FCC recommended this in its National Broadband Plan of March 2010, saying, “Rec. 8:19: Congress should make clear that Tribal, state, regional and local governments can build broadband networks.” There is very little of this in

Western states, but today nearly 60 cities in the US, big and small, own citywide fiber networks while another 79 own citywide cable networks. Over three million people have access to telecommunications networks whose objective is to maximize value to the community in which they are located rather than to distant stockholders and corporate executives. These networks bring jobs and energy to the cities they serve.

Finally, a major problem confronted by regulators across the world is the difficulty in grasping the facts of their private communications providers' operations. Requiring that AT&T permit accredited auditors of network performance (e.g., California's CAIDA) to observe network traffic patterns in real time would be a real service to Internet research worldwide; at the moment, we are essentially making policy in the dark. Requiring that AT&T open its financial books to a meaningful audit function would greatly increase California's understanding of the reality of the margins reaped and expenditures made in connection with this essential service. Right now, regulators must take the carriers' word for this information, which makes it very difficult for resource-constrained public servants to regulate.

It's worth noting that, as with the cable world, AT&T and Verizon are aiming their scaling and bundling efforts at the richest Americans, the consumers who are willing to continually pay more. In serving this market, they are unaffected by products offered by low-price pre-paid carriers; those accounts aren't the ones they want. German T-Mobile noticed this - in that same investor call in January, Rene Obermann said:

> "[T]he US market has a relatively benign pricing environment although usage is much higher so you could argue price per minute or price per megabyte or so are significantly lower but the overall willingness of customers to spend higher. [A]RPUs per month is here in the US is higher and the packages which are being sold and the price points which are being sold are quite favorable in comparison to most European markets. That does create, if you look at the evidence in Germany and Italy and some other markets, it does create scope for successful challenging strategies and it's also worthwhile noticing that different to Europe we are speaking about a market that is mostly free from price regulation."

This "benign pricing environment" is the context in which AT&T and Verizon want to reap their increasing private returns from their existing infrastructure investment. In our country, the rich are getting richer as a matter of communications capacity as in all other things; as Bernstein recently pointed out, "more affluent customers are racing to iPhones, 4G data speeds and richer data plans, while the lower end is furiously trading down to pre-paid wireless and even government-subsidized Assurance plans." (Bernstein, "U.S. Telecommunications and Cable & Satellite: The Poverty Problem," May 2011.) Recently, two-thirds of gross wireless subscriptions were for pre-paid services, and pre-paid contracts are the fastest-growing segment of wireless services.

This merger sheds light on this deep problem of social equity; just as, in 1905, rich Americans believed that electricity was a luxury that should be reserved for the affluent (see Peter di Cola's recent article, "The Killer App of 1900"), so too, now, rich Americans (and rich policymakers) believe that smartphones and truly high-speed Internet access are luxuries that not all should be able to afford. They are not luxuries; they are now essentials. The middle of the wireless market, like the middle of America, is hollowing out. We should be wary of AT&T's promises to bring slow wireless access to rural and poor Americans; it will be second-class access.

Thank you again for the opportunity to testify here today.