

The Termination Conundrum as Networks Migrate to IP-based NGNs

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Fixed Interconnection

- A range of different wholesale arrangements
 - Internet peering and transit
 - Calling Party's Network Pays (CPNP)
 - Bill and Keep
- What challenges to existing arrangements are inherent in the migration to IP-based NGN?
- Recent developments
 - The WIK report of March 2008
 - The Commission consultation of June 2008
 - The ERG Common Statement



So what's wrong with termination, anyway?

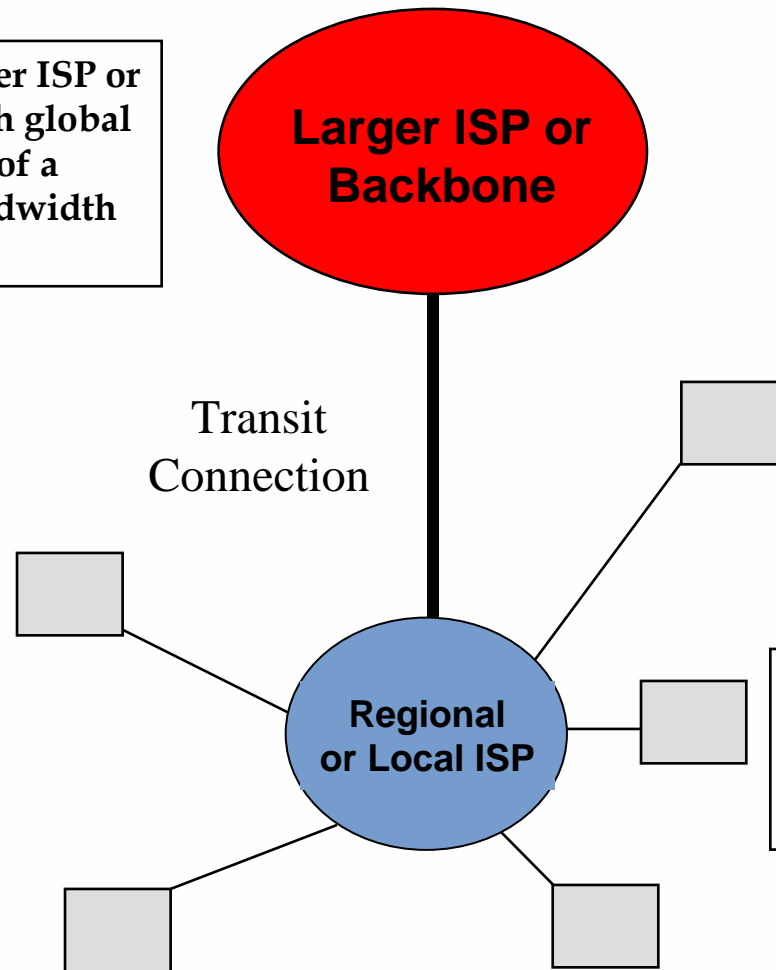
Internet Peering and Transit

- “*Peering* is an agreement between ISPs to carry traffic for each other and for their respective customers. Peering does not include the obligation to carry traffic to third parties. Peering is usually a bilateral business and technical arrangement, where two providers agree to accept traffic from one another, and from one another’s customers (and thus from their customers’ customers). ...
- *Transit* is an agreement where an ISP agrees to carry traffic on behalf of another ISP or end user. In most cases transit will include an obligation to carry traffic to third parties. Transit is usually a bilateral business and technical arrangement, where one provider (the transit provider) agrees to carry traffic to third parties on behalf of another provider or an end user (the customer). In most cases, the transit provider carries traffic to and from its other customers, and to and from every destination on the Internet, as part of the transit arrangement. In a transit agreement, the ISP often also provides ancillary services, such as Service Level Agreements, installation support, local telecom provisioning, and Network Operations Center (NOC) support.
- Peering thus offers a provider access only to a single provider’s customers. Transit, by contrast, usually provides access at a predictable price to the entire Internet.
- Historically, peering has often been done on a bill-and-keep basis, without cash payments. Peering where there is no explicit exchange of money between parties, and where each party supports part of the cost of the interconnect, ... is typically used where both parties perceive a roughly equal exchange of value. Peering therefore is fundamentally a barter relationship.”

- NRIC V (US FCC), Interoperability Focus Group

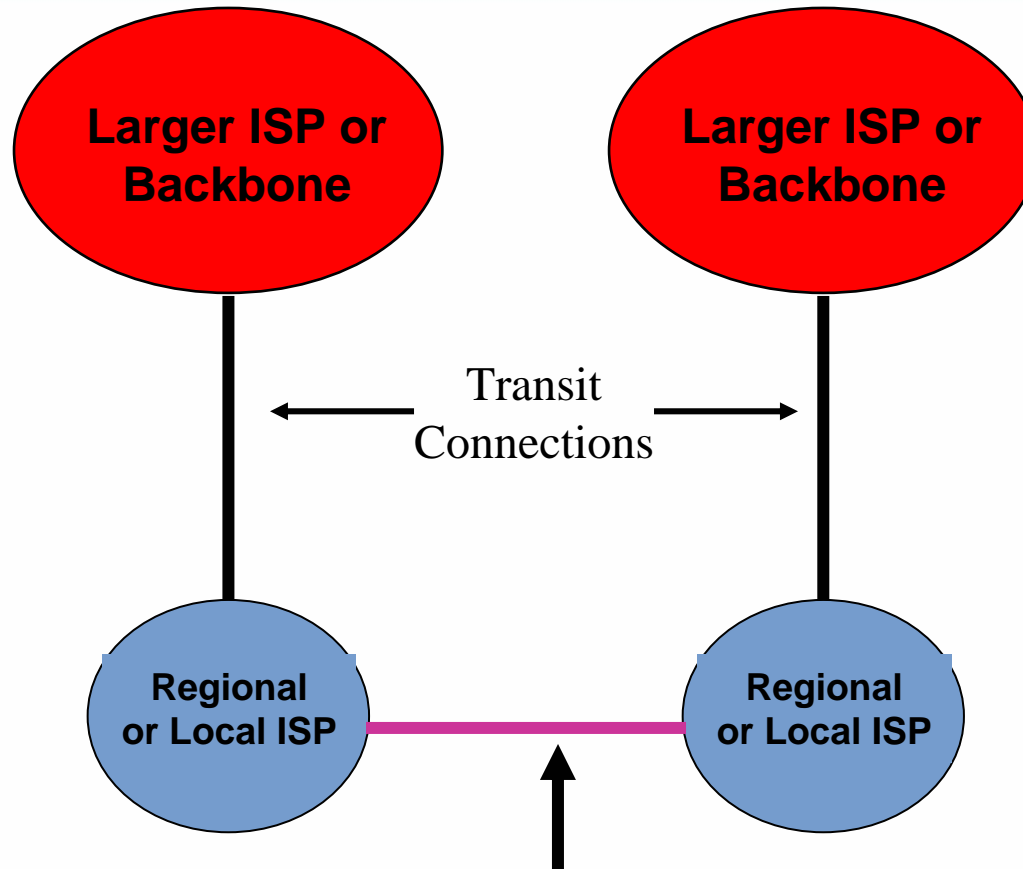
Internet Peering and Transit

Concentration to a larger ISP or backbone provider with global connectivity by means of a concentrated, high bandwidth connection



Many remote locations connect to a regional or local ISP with individual, low bandwidth connections

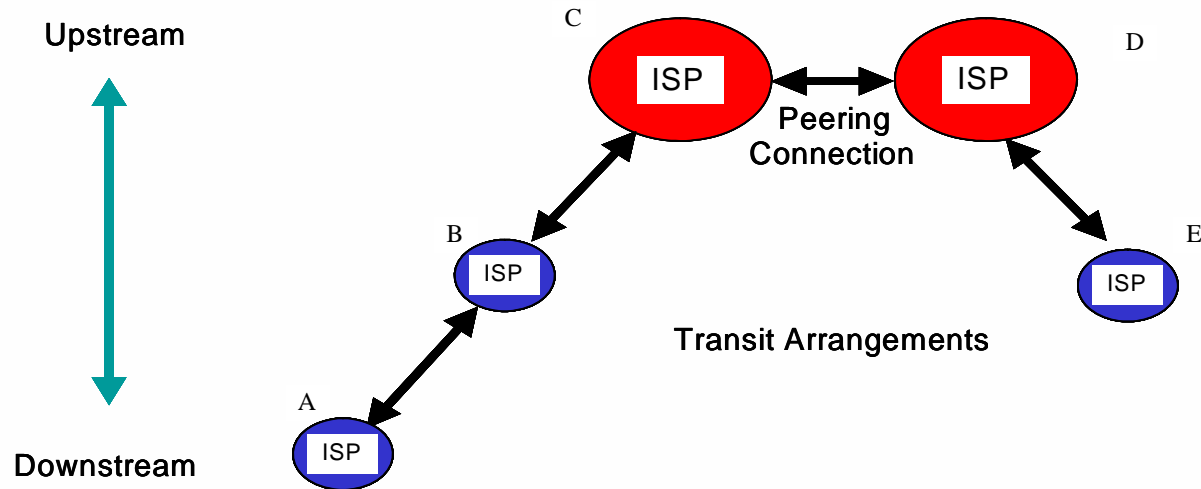
Internet Peering and Transit



This peering connection will tend to exist if the cost of the connection to each ISP is less than the money each saves due to reduced transit traffic.

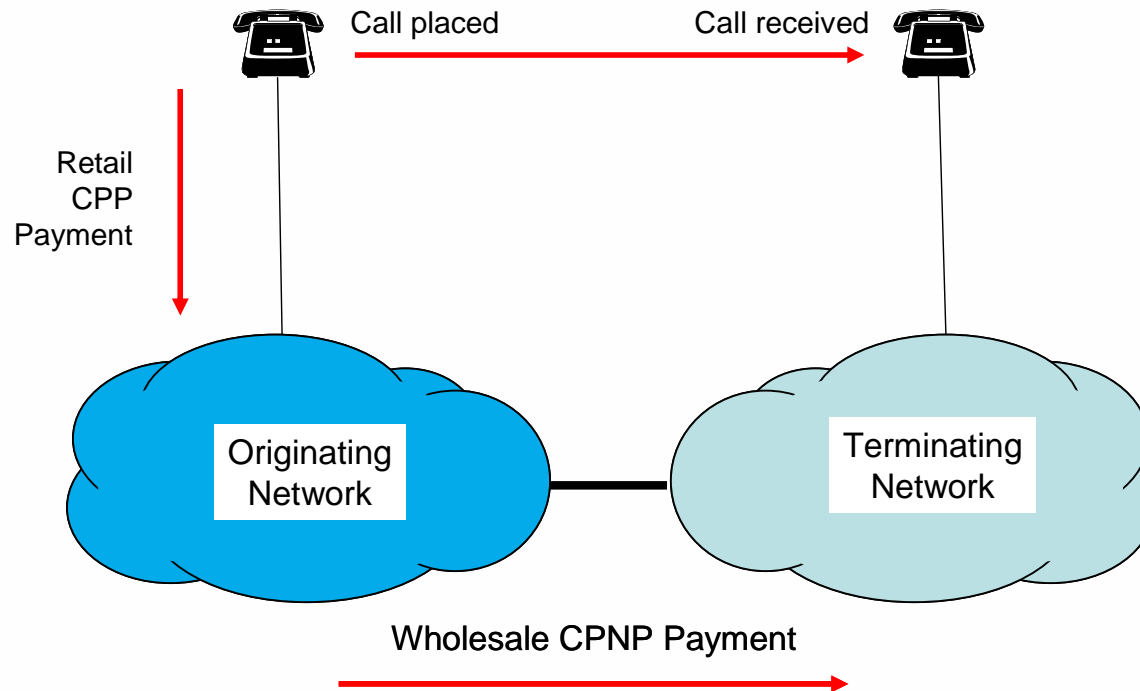
Internet Peering and Transit

Two peers and their respective transit customers



<i><u>Parties</u></i>	<i><u>Interconnection Arrangement</u></i>	<i><u>Typical Nature of Agreement</u></i>	<i><u>Typical Commercial Arrangements</u></i>
A – B	Transit	Bilateral	Payment reflects capacity, and may reflect volume of traffic or near-peak traffic level.
B – C	Transit	Bilateral	
E – D	Transit	Bilateral	
C – D	Peering	Bilateral	Often done without payment

Calling Party's Network Pays (CPNP)



Calling Party's Network Pays (CPNP)

- CPNP is not a consequence of regulation; it is a consequence of terminating monopoly power (consider the European mobile sector prior to 2003).
- A *wholesale* payment compensates for an asymmetry in *retail* payment arrangements.
- Rationality tacitly rests on many assumptions:
 - That there is a fundamental and easily discerned difference between placing and receiving a call.
 - That the wholesale payment approximates the cost of call termination.
 - That the network exists primarily to carry voice.
 - That the retail service party is the same as the wholesale network operator.

- Used in the United States, Canada, Hong Kong and Singapore.
- None of these countries use Bill and Keep in all cases.
- The US is perhaps best understood. US arrangements include (among others):
 - *Access fees* where long distance carriers connect to local network operators.
 - *Reciprocal compensation* between local carriers.

- Reciprocal compensation in the US

A – Terms are established through voluntary negotiations, often as Bill and Keep.

B – Reciprocal compensation is paid to the ILEC at a rate limited to the ILEC's forward looking marginal cost.

C – Reciprocal compensation is paid to the CLEC or mobile operator at a rate limited to the ILEC's forward looking marginal cost unless the CLEC or mobile operator can demonstrate a higher forward looking marginal cost.

Origination	Termination		
	ILEC	CLEC	Mobile
ILEC	A	C	C
CLEC	B	A	A
Mobile	B	A	A

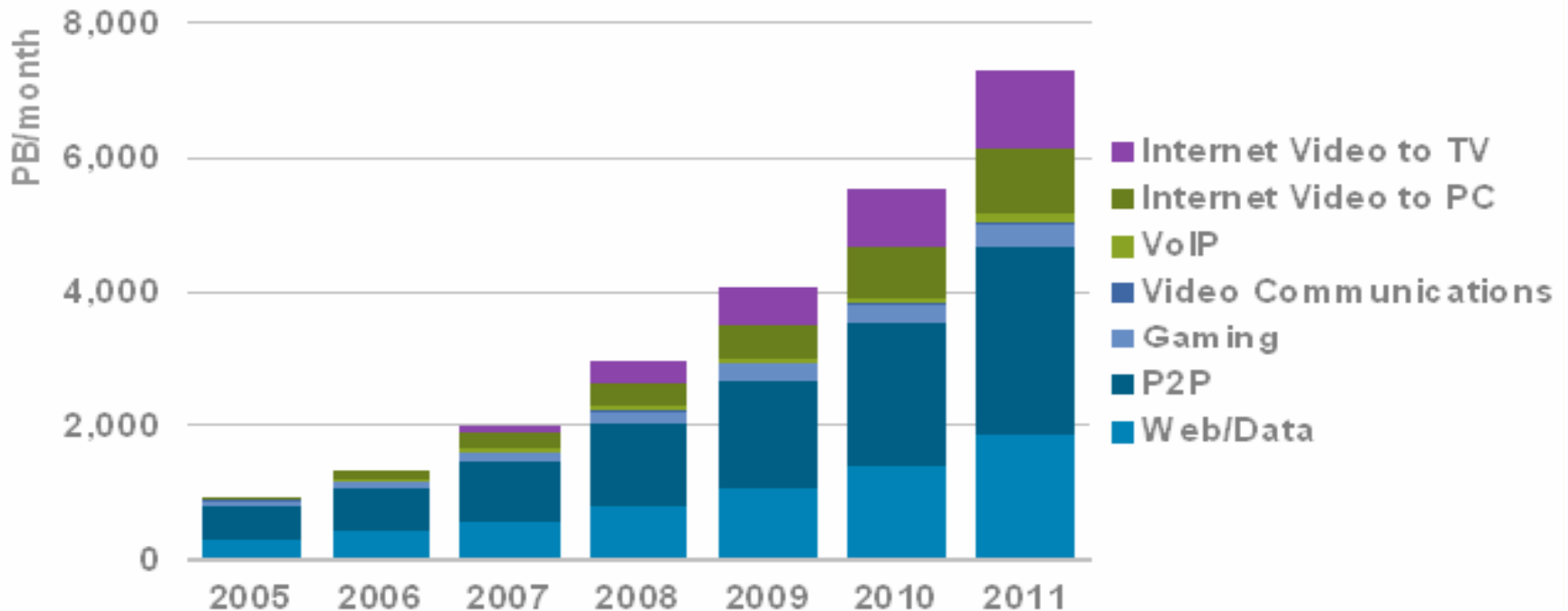
Bill and Keep

- Bill and Keep in the US is an *option*, not an *obligation*.
- Mobile operators are treated exactly the same as non-dominant fixed operators.
- These arrangements effectively prevent mobile rates from being higher than fixed, and thus prevent mobile operators from taking a high mark-up on F2M calls.
- With that incentive eliminated, operators often agree to Bill and Keep.
- Fixed incumbents have often chosen Bill and Keep; for example, GTE and Pac Bell in Los Angeles.
- Bill and Keep achieves good results, but is tricky.

The move to NGN poses challenges

- Rationality of CPNP rests on many assumptions:
 - That there is a fundamental and easily discerned difference between placing and receiving a call.
 - That the network exists primarily to carry voice.
 - That the retail service party is the same as the wholesale network operator.
- The assumption about call initiation – which was always dubious – is now easily arbitrated.
- Voice is one of many services, and makes only a small contribution to the cost of future networks.
- Retail service providers might not be network operators (Vonage, SIPgate, Skype).

The move to NGN poses challenges



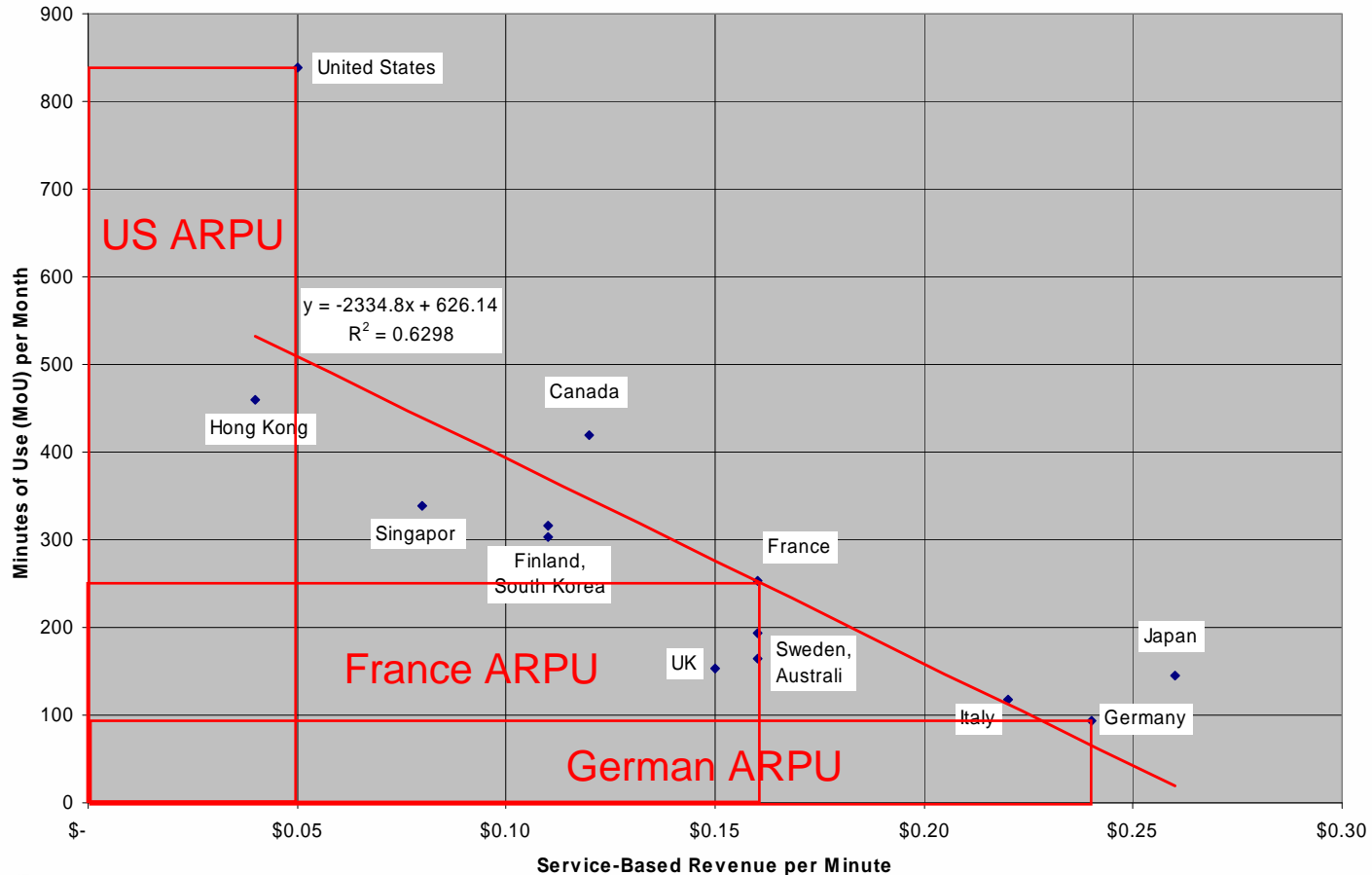
“The Internet is not collapsing under the weight of streaming video. In the near term, the most formidable challenge that online video poses for the Internet will be flash crowds rather than the overall volume of traffic.”

Source: Cisco (2007)

The move to NGN poses challenges: Mobile usage responds to unit price

Mobile Usage Responds to Unit Price

Merrill-Lynch Data 4Q2006, as quoted by the U.S. FCC 12th CMRS Report



The move to NGN poses challenges

- The Internet addresses interconnection in a completely different way.
 - No reliance on the party that initiated a TCP session, etc.
 - No special privileged role for voice, and it is not clear that there is a terminating monopoly for voice (or for any other service).
 - For transit, payment to reach third parties and/or the whole Internet seem to be reasonable market outcomes.
 - For peering, negotiated prices (often zero) again appear to be reasonable market outcomes.
- Requires no regulatory intervention.

The move to NGN poses challenges

- Network operators with market power will attempt to retain high MTRs as long as possible.
 - Direct revenue benefits (15-20% or more of revenue).
 - High MTRs depress usage and ARPU, but may inflate profit.
 - High MTRs facilitate on-net off-net price discrimination that prevents challengers from competing on price.
- The migration to IP does not in and of itself eliminate the termination monopoly.
- The problem is unlikely to go away by itself.

Recent developments: the WIK Report

- March 2008 study for the European Commission
- No need for major changes for data interconnection.
- Voice will continue to pose challenges.
- Recommended reducing MTRs dramatically, but not necessarily to zero, over three to five years.
- Recommended no regulation to retail arrangements for voice
- Recommended no major changes as regards IP data interconnection.

Recent developments: the WIK Report

- Did *not* recommend adoption of RPP.
 - No need to regulate the *level* or the *form* of *retail* payments.
 - This is strictly between the service provider and the customer.
- Did *not* recommend a flag day cut-over.
 - Lower MTRs will tend to imply lower usage fees, higher monthly fees, and lower handset subsidies.
 - Service providers and customer preferences will surely need time to settle in.
- Did *not* recommend literal adoption of the complex US system.

Recent developments: the Commission

- Recommended NRA adoption of LRIC costing methods limited to usage-based costs specific to the voice service.
- Would likely lead to MTRs in the neighbourhood of €0.02 or €0.03, compared to the current € 0.0967.
- Fully compatible with WIK recommendations.

Recent developments: the ERG

- The ERG common statement cautiously leans in the direction of the adoption of Bill and Keep.
- Fully compatible with WIK recommendations.



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