Name		Steve Zoromsky Lower Colorado River Authority (LCRA	1																					
Company Contact		Lower Colorado River Authority (ECRA	)																					
Information	P.O. Bo	ox 220 Austin, Texas 78767 (512)473-3532 steve			-	un ational Dogwins	manta /Saa l	Definitions	Dalami			Functional Docum	annonto (Can I	Definitions	Delessa)				Tools	malami Onti	ana (Dank nua	-fores 2 1 0 fo	y angle halawy	
			Estimated Number of Communications			unctional Require	ments (see i	Definitions	Belowj			Functional Require	ements (see t	Definitions i	Belowj				Tecr	inology Opti	ons (Kank pre	eference 1-8 fo	r each below)	
			Nodes to be	Estimated Number of																		Commercial	Commercial	
			Deployed for Each Application (e.g.	End Point Devices to be Deployed for Each		Bandwidth Throughput						Bandwidth Throughput					Licensed Wireless	Licensed Wireless	Unlicensed		Other Private	Wireless Network	Wireless Network	Commercial Wireline
			thousands of	Application (e.g.	AC Independence		Coverage	Latency	Reliability	Security	AC Independence		Coverage	Latency	Reliability	Security	Radio	Microwave		Fiber	Network	(Licensed)	(Unlicensed)	Network
			collectors)	millions of meters)		Quar	ntified Estim	ates	T	ı	Ranking of	Relative Importa	nce of Each Fu	<mark>unctional Re</mark>	equirement (1	6)		I	I	T	Tier	1	1	I
		Remote Meter Reading (based on																						
		hourly reads)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Advanced Metering Direct Load Control	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Advanced Microfing																						
			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	er	Real time pricing																						
	stom	rear entre prients																						
	ð	Distributed Generation Management  At the customer	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		PHEV Integration premises	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		At charging stations								<b> </b>		+	+				1			1			<u> </u>	
		Pricing Signals to Smart Appliances	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		in-Home Display of Customer Usage	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					-						-													
		Automated Feeder Switching  Capacitor Bank Control	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
		Fault Current Indicator	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Distribution	Transformer Monitoring	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Voltage and Current Monitoring	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Su																								
catio		Renewable Energy/Distributed Generation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Appli		Network Protection Monitoring	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		AMI Network Management	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
		Remote Connect/Disconnect	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	v	Meter Data Management	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	ation	Outage Management	315	6,300	72 hrs	1500 kbps	90%	500 ms	99.9999%	5	6	3	5	4	1	2	3	2	5	1	6	7	8	4
	Opera	Distribution Asset Management	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Distribution Network Management	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Demand Response  Wide Area Situational Awareness (PMUs)	n/a 315	n/a 6,300	n/a 72hrs	n/a 1500 kbps	n/a 90%	n/a 500 ms	n/a 99.9999%	n/a 5	n/a 6	n/a 3	n/a 5	n/a 4	n/a 1	n/a 2	n/a 3	n/a 2	n/a 5	n/a 1	n/a 6	n/a 7	n/a 8	n/a 4
	ssior	Line Protection and Control	315	315	72hrs	1500 kbps	50%			5	6	3	5	4	1	2	3	2	5	1	6	7	8	4
	nsmi						1	<del>                                     </del>	-	<del>                                     </del>		1	+	<del>                                     </del>	-	-	1			1	1	1		
	Tra									<u> </u>			<u> </u>											
	Ļ	Billing	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	ovide	Customer Information Management	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	e Pro	Consumer Web Portal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	ervic						-		-	-		1	+		-							-	-	
	65																							
	Ŀ.	Emergency Response	320	8,000	72hrs	9600 kbps			99.9999%	5	6	4	1	5	2	3	3	2	5	1	6	7	8	4
	Othe	Routine Dispatch	320	8,000	72hrs	9600 kbps		250 ms		5	6	4	1	5	2	3	3	2	5	1	6	7	8	4
		Workforce Automation	320	2,000	72hrs	9600 kbps	95%	250 ms	99.9999%	5	6	4	1	5	2	3	3	2	5	1	6	7	8	4
						<u> </u>		•																
-		LCRA is a G&T (Generation and Transmission). W		Comments (explain your		mers who are mu	nicinals and	coonerative	s As such 10	RA is not														
		directly involved in smart grid activities.	e ao not have distribut	but we have 44 elec	and wholesale custo	cis wild are illui	cipuis and	cooperative	.s. 715 sucii, EC	2.2.13 1100														
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	De	refinitions (please report your data based on the definitions below)												
<b>50</b>		what applications need backup power to provide restoration and for how long (measur												
enti		are required to support this application during normal and emergency conditions (meas	sured in kilobits per second (kbps))											
tion		tworks are required to operate (estimated percentage of service territory).												
mu danir	, , , ,	ed to be updated (measured in milliseconds (ms) from endpoint-to-endpoint (i.e. not rou	177											
Rec F		are tolerated and how well must this network provide accurate data (as a percentage of						1						_
	Security How secure must the network be	pe from cyber and physical attacks (one a scale of 1-5 with 1 being low and 5 being high)	)?					+ +						+
								+ +						+
								+ +						-
								+ +						+
	Tier 1 – Core Backbone							1						+
suo		twork is the primary path to the utility data center and data processing infrastructure	e. The core may also be the transport for	r enterprise applications a	and will typically be a	architected	in a self-healing ring to	ology or poi	nt-to-point w	ith backup ci	rcuit redunda	ncv. The co	re may have points-of-pres	ence in substati
cati													.,	
를 높	Tier 2 – Backhaul Distribution													
mm	The distribution tier will aggre	egate the field area network including collectors, RF access points, data concentrator	rs, etc. from the field access tier of the ne	etwork and provide a deli	ivery transport bridge	e to the co	e backbone tier.							
- Co														
Gric Gric	Tier 3 – Access													
art	At this tier end-point devices v	will gain access to the network. It is commonly referred to as the last mile communic	cation or Field Area Network and will be	relatively low bandwidth	h for hand off to the E	Backhaul Di	stribution Tier.	_						
Sm	T. 6 11 A 21 1 (1122)							1						_
	Tier 4 – Home Area Network (HAN)	communicate with the Access tier through various technologies. The HAN has not ye			lika ZiaDaa ay Hawa	Dive which		:	antinu Tinu 2	Tion 3 on Tion	. 1			
	in nome devices will typically o	communicate with the Access tier through various technologies. The HAN has not ye	et converged on a standard but is likely t	to consist of technologies	like zigbee or nome	Plug Which	may connect directly w	ith communi	cation Her 3,	, Her Z or Hei	1.			+
								-						
	Licensed Wireless Radio	Private licensed wireless radio networks operating	g under Part 90 of the ECC rules											
	Licensed Wireless	i rivate ncenseu wireress radio networks operating	g under rait 50 of the rectules					† †						+
	Microwave	Private licensed wireless microwave networks ope	erating under Part 101 of the FCC rules											
Suc	Unlicensed Wireless	Private unlicensed wireless radio networks operat	•	Vi-Fi, WiMAX, Zigbee)				† †						1
ptic	Fiber	Private fiber networks owned or controlled by a u												
0 25	Other Private Network	Private networks that are neither fiber nor wireles	ss, such as powerline carrier											
golo	Commercial Wireless													
- uh	Network (Licensed)	Commercial networks that operate using licensed	radio under Part 22 of the FCC rules (e.g.	. Verizon, AT&T, Sprint, etc	c.)			1						
Tec	Commercial Wireless													
	Network (Unlicensed)	Commercial networks that operate using unlicens	sed radio under Part 15 of the FCC rules (e	e.g. wireless internet servi	ce providers (WISPs))	1		1						
	Commercial Wireline	Communication and the state of	and any trade of the Sthere DCI	to and to state of a site of	-114>									
	Network Satellite	Commercial networks that use any wireline technical Satellite includes all types of fixed and mobile sate			circuits)			+ +						+
	Jacenite	Satellite ilicidues all types of fixed and mobile sate	einte services, including very sittali Aperti	ure reminidis (VSATS)		<u> </u>		1		l	l			

			<u> </u>			<u> </u>	1	<u> </u>									<u> </u>									1	
			Technolo	ogy Options	(Rank prefe	rence 1-8 for ea	ach below)					Technol	ogy Options	(Rank pref	erence 1-8 for	each below)					Technolo	ogy Options	(Rank prefe	rence 1-8 for ea	ch below)		
Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed	Fiber	Other Private Network	Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed		Other Private Network	Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed Wireless	Fiber	Other Private Network Tier 4	Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a
n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a 9 n/a	n/a 2 n/a	n/a 1 n/a	n/a 5 n/a	n/a 3 n/a	n/a 6 n/a	n/a 7 n/a	n/a 8 n/a	n/a 4 n/a	n/a 9 n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a
n/a n/a 9	n/a n/a 2 2	n/a n/a 1	n/a n/a 5	n/a n/a 3	n/a n/a 6	n/a n/a 7 7	n/a n/a 8	n/a n/a 4 4	n/a n/a 9	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
9	2 2	1	5	3	6	7 7	8 8	4	9	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a	n/a n/a
9	2	1	5	3	6	7	8	4	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
				<u> </u>	<u> </u>		<u> </u>			<u> </u>			<u> </u>	<u> </u>			L					<u> </u>					<u> </u>

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ns and other co	ompany facilities.											