Diamond流表设计

1. 流表顺序与必要性讨论

参考软交换机流表,考虑到板卡实际处理逻辑,流表映射对比如下:

软交换机流表	板卡流表	原因	序·
以太表 🦛 🕬	无 宋惠2546	Parser处理	
IPv4表	无 18.2546	Parser处理	天磊 2546
IPv6表 # ^{60,7546}	Local表 # 15A6	这张表会判断目的地址在不在本节点上,形成Packet状态供后续(组播、增强传输)表使用。 表项上有Counter,用于下行流量统计。	O 編 2546
高可靠传输收 侧表	高可靠传输收侧 表	宋額 ²⁵⁴⁵ 宋額 ²⁵⁴⁵ 宋額 ²⁵⁴⁶ 宋額 ²⁵⁴⁶ 宋額 ²⁵⁴⁶ 宋額 ²⁵⁴⁶	1 元器 25 ⁴⁶
UDP表	无 宋龍 2545	Parser处理	
IRA匹配表	Dispatch分发表	TCAM匹配IRA、SEAID.type、Inport端口类型、Cache Hop	2
隐匿表	隐匿表	宋麗 25 ⁴⁰ 宋麗 25 ⁴⁰ 宋麗 25 ⁴⁰	3
缓存表	无	合并到了 Dispatch分发表	7 Ba
组播数据表	组播Flow表	软交换机在指令块里进行了数据包复制和字段修改;而板卡独立 出了复制引擎,分解了组播查找、复制和修改字段动作	4 2546
宋嶽 ²⁵⁴⁶ 森 2546	复制引擎	宋慕 2546 宋慕 2546 元孫 2546	5
组播复制转发 表	组播Packet修改 索引表	宋慕 25A6 宋慕 25A6	6
簇 25 16 宋颢 2546	组播Packet修改 表	実践 ²⁵⁴⁶ 実態 ²⁵⁴⁶ 実態 ²⁵⁴⁶ 実態 ²⁵⁴⁶ 実	7
多路径传输表	多路径传输表	宋颢 25 ⁴⁶ 宋颢 25 ⁴⁶ 宋颢 25 ⁴⁶	8
OFIB1	OFIB1 ## 25 ^{A6}	宋語 25A6 宋語 25A6 宋語 25A6	9
磊 2546	宋磊 ²⁵⁴⁶	完額 25 ^{Ab} 宋額 25 ^{Ab} 宋額 25 ^{Ab} :	末磊 2546

OFIB2	OFIB2	宋磊 2546				10
OFIB3 **** 25 ^{A5}	OFIB3	宋颢 2546				11
INT表	无 2546	小节点不支持带内	遥测	宋磊 2546		宋磊 2546
线路选择表	源地址表	用于修改源地址,	位于OFIB与FIE	3之间。	宋磊 2546	12
FIBv6	FIB HOST	拆成了三张表	宋器 ²⁵⁴⁶	宋語 ²⁵⁴⁶		13
宋龍 25 ⁴⁶ 7種 2546	FIB LPM	宋縣 25.46	7票 2546	宋籍 ²⁵⁴⁶	宋龍石師	14
	邻接表	安羅 2546				15
FIBv4	无 ************************************	Parser处理,直通				宋磊 ²⁵⁴⁶
ID解析表	ID解析表	宋羅 2546				16
高可靠传输发 侧表	高可靠传输发侧 表	宋颢 2546				17

2. 流表规格

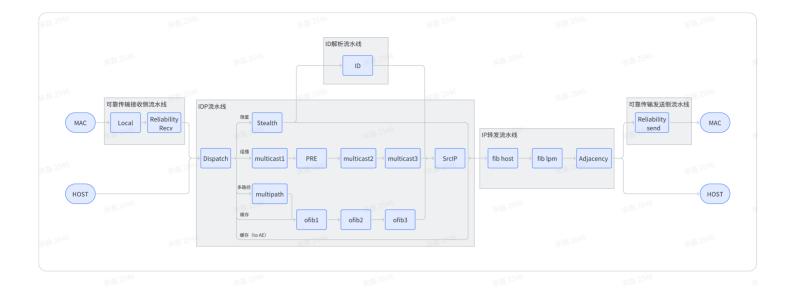
最终Diamond迭代包含的流表规格如下

流表序号	流表名称	流表类型	流表深度	说明
可靠传输接收值	则流水线			
O 宋徽 2546 宋徽 2546	Local表 ^{集集 2546}	EM HASH	128 ************************************	HASH表实现时深度翻倍; 每条表项有FlowState,用来作 为Counter统计下行流量;
第 1 1546 宋 第 2546	高可靠传输收侧表	EM HASH	1024 928 2546	HASH表实现时深度翻倍; 每条表项有FlowState,用来标 识接收侧流预期的RPN号;
IDP流水线				
2 宋爾 2546	Dispatch分发表	ММ ТСАМ	32 93 2546	
3	隐匿表	Group	128	
4,546	组播Flow表	EM HASH	1024/4096	HASH表实现时深度翻倍
5 x 2546	复制引擎	Linear ## 2546	1024/4096	
6	组播Packet修改索引表	Linear	2048/8192	宋語 2546 宋語 2546

7	组播Packet修改表	Linear	1024	宋颢 2540 宋颢 2540
8 8 ± 25 ⁴⁶	多路径传输表	EM CAM	256	表上有TableState,包含8个路 径的ServType号码以及权重;
		宋甄 25 ^{A6} 宋颢 25 ^{A6}	宋孫 ² 546	每条表项有FlowState,包含当前Index、每个路径的当前权重和nextServType;
9 宋慕 2546	OFIB表1	EM HASH	1024	HASH表实现时深度翻倍
10 突厥 2546	OFIB表2	Linear	8192	表上有TableState,包含8个路 径的ServType号码
11	OFIB表3	Linear	1024	宋語 25.46 宋語 25.46
12 ^{宋藤 2546}	源地址表	Linear ****	128	每条表项有FlowState,用来作 为Counter统计上行流量;
IP转发流水线	· 宋磊 25 ⁴⁶	宋磊 2546	· 宋慕2	546 宋慕2 ⁵⁴⁶
13	FIB HOST	EM HASH	1024	HASH表实现时深度翻倍
14 *** 2546	FIB LPM	LPM TCAM	16	546 宋慕 2546
15	邻接表	Linear	1024	宋徽 25 ⁴⁶ 宋徽 25 ⁴⁶
ID解析流水线	· 宋磊 2546	宋磊 2546	宋磊2	5,46 宋第 25,46
16	ID解析表	EM HASH	2M/8M	存储在片上DDR中
可靠传输发送侧	则流水线	宋磊 25 ⁴⁶	宋磊2	AC 实施 2546
17 宋源 2546	高可靠传输发侧表	EM HASH	1024	HASH表实现时深度翻倍;
		宋語 2546	宋磊 2546	每条表项有FlowState,用来标识发送侧流预期的RPN号;

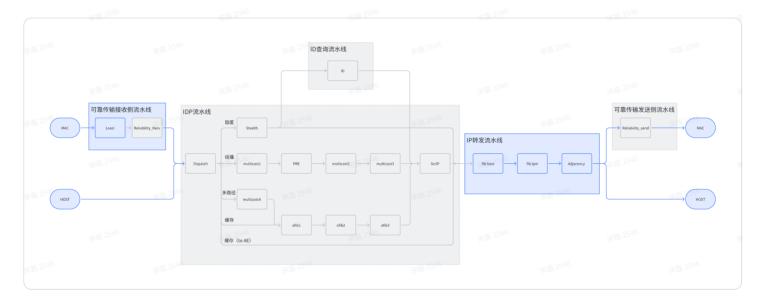
3. 流表跳转图

1. 总图



2. 各类网络数据报文处理示意

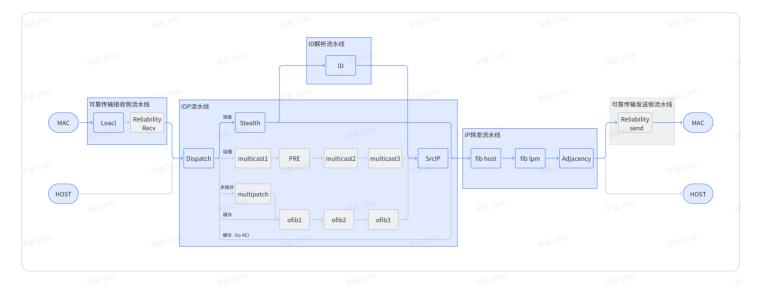
3.1 非IDP报文



IDP流水线的Parser解析数据包的各层协议类型,非IDP数据包会跳过IDP流水线MAU的处理,交给IP转发流水线执行路由转发:

- a. 如果该报文是ipv6数据报文,则根据报文中的ipv6目的地址在fib表中查询报文输出的端口并进行修改mac地址、vlan头部等操作;
- b. 如果该报文不是ipv6数据报文,则根据报文输入端口决定输出端口,不进行报文内容的修改(转发模式);
- c. 特别地,对于IPv6 NS报文则会在IP转发流水线的parser处直接pktin

3.2 IDP隐匿报文



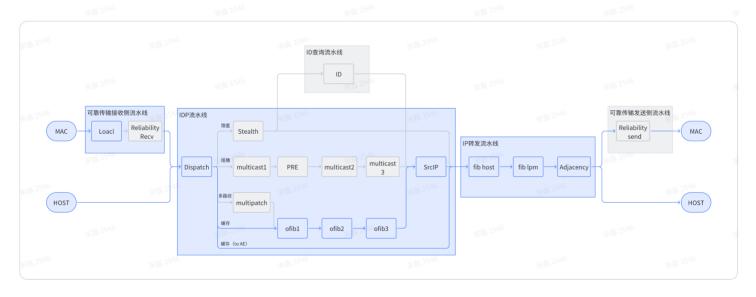
IDP隐匿报文由IDP流水线中的隐匿MAU以及ID查询流水线处理:

当IDP隐匿报文中的跳数为0时,该报文会前往ID查询流水线查询dst_ID获取对应的dstIP以及需要修改的srcIP(在srcIP修改表中的地址),随后回到IDP流水线修改srcIP,并在ip转发流水线中根据获得的dstIP查询转出端口;

而当IDP隐匿报文中的跳数不为0时,则会在隐匿MAU中随机选择下一跳节点(称为随机游走), 并根据获得的下一跳节点地址在ip转发流水线中查询转出端口;

同时当IDP隐匿报文中的跳数不为0时,也有可能一定几率前往ID查询流水线(称为直接转发),报文在隐匿MAU随机游走与直接转发的实现是通过使用以时间戳作为随机种子的随机选择实现的。

3.3 IDP缓存报文



IDP缓存报文由IDP流水线中的Dispatch MAU处理:

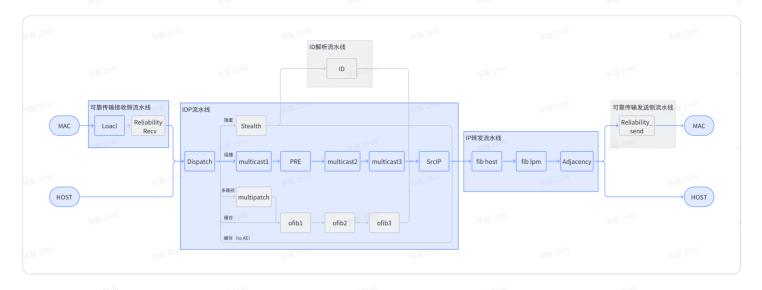
来自HOST的缓存请求,通过OFIB发出;

来自MAC的缓存请求,转给AE(通过HOST);

跳数不为0的缓存数据,跳数减一并通过OFIB发出;

跳数为0的缓存数据,转给AE(通过HOST)。

3.4 IDP组播报文

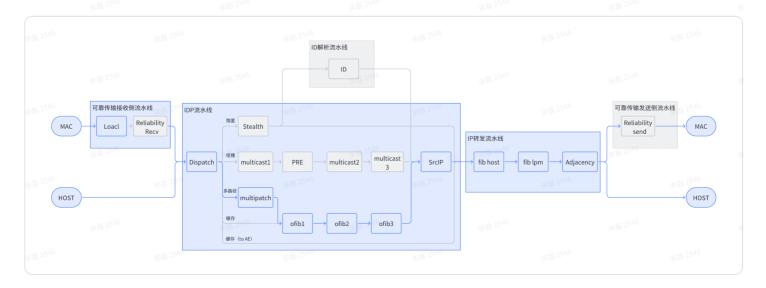


组播数据报文的处理由组播1、2、3 MAU以及复制引擎实现:

- a. 组播表1通过id获得报文在复制引擎中对应的索引
- b. 复制引擎根据索引将报文复制,并给每个复制报文提供连续的索引以及在组播表2中的偏移
- c. 组播表2则根据偏移和索引获得组播表3的索引,该索引可以不连续以实现在不同组播流中的自由复用相同的报文数据操作
- d. 组播表3根据索引实现对报文目的地址的修改,同时指示源地址修改表的索引
- e. 最终报文在源地址修改表中完成源地址的修改,前往ip转发流水线完成处理流程

组播控制报文的处理,由IDP流水线将发往local地址的SCMP报文PKTIN给控制器,控制器通过 PKTOUT发出控制报文;不是发往local的控制报文交给IP转发流水线转发。

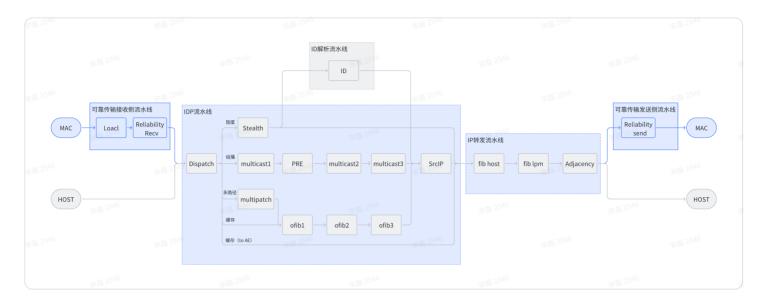
3.5 IDP多路径报文



IDP多路径报文由IDP流水线中的多路径 MAU处理:

根据报文中的mpt与表状态中的mask确定报文可以选择的拓扑,随后进入流表匹配获得根据权重 计算得到选择的拓扑。

3.6 高可靠传输报文



高可靠增强传输相关逻辑由高可靠发送侧流水线以及接收侧流水线处理,而在IDP流水线中按照普通IDP报文处理,具体的:

- a. 接收侧DAT丢包检测:在Reliability_Recv表中比较Pkt.RPN和Flow.RPN,当Pkt.RPN > Flow.RPN时检测到DAT有丢包,触发接收侧发NACK。
- b. 接收侧发起NACK: 在高可靠增强传输接收侧流水线出口,通过NACK报文发生器按需构造向上游的NACK报文。
- c. 发送侧DAT发送:在Reliability_Send表中用当前Flow.RPN设置Pkt.RPN,DAT报文除正常发出之外,同时产出一份DAT报文交给可靠发送缓存模块缓存。
- d. 发送侧重传:来自网口的NACK报文会一直透到Reliability_Send表进行处理,在此颠倒点到点源目的IP进行匹配,将匹配到的表项号随NACK包一并交给可靠发送缓存模块,可靠发送缓存模块取出缓存的数据包发回到流水线,直接跳转到Reliability_Send表再次发送。

4. 流表设计

0.Local 表

Local MAU (EM,	HASH	, 128 entr	ies) 每条	表项上需要	₹Counter (uii	nt64)	
Field		Bits	Maska ble	Option al	Description		
Dst IP		128	No 95 35 25 46	No			

			宋磊 2546			,用于判定数据包目的地址是不是本节			是本节
宋磊 2546		宋磊 2546		宋磊 2546	点。	宋磊 2546		宋磊 2546	
磊 2546	宋磊 2546		宋磊 2546		宋磊 2546		宋磊 2546		宋磊 2546
ActionData		Bits	Area		Description				
LocalType		1	[0] = 25.46						
NextTable 25.45		5 宋灏 2546	[5:1]						
磊 2546	宋磊 2546		宋磊 2546		宋磊 2546		宋磊 2546		宋磊 2546
FlowState		Bits	Area	宋磊 2546	Description	宋磊 2546		宋磊 2546	
BytesCounter	宋磊 2546	64	[63:0]		某端口的SEA	Net包统记	十,可通过	로FlowReq:	查到

示例表项		动作	说明	
7001::0001		Set Local 1	是自	_{宋磊 2546} 己
宋磊 2546		BytesCounter += PktLen	数据	包先看是不是高可靠
		If 高可靠valid	传输	
		Set IPIndex	宋惠 2546	
		Goto Reliability_Recv Table		
		Else	宋磊 2546	
		Goto Dispatch Table		
(Default)		Set Local 0	宋壽 2546	
		Goto Dispatch Table		

1.高可靠传输收侧表

Reliability_Recv MAU (EM, HASH	l, 状态可编	程,1024)	宋麗 2546		
Field	Bits	Maska ble	Option al	Description		
RSIP	128	No *** 25.46	No	SEANet传输层的RSIP。		宋磊 2546
DstIP ## 2549	128 2546	No	No ** 3 2546	目的IP地址	宋磊 2546	
震 25 46		宋龍 2546		宋龍 2546 宋龍 2546		宋磊 2546

	,46 	宋磊 2546					
ActionData	Bits	Area	宋磊 2546	Description		宋磊 2546	
磊 2546 宋磊 25	,46 -	· 宋磊 2546		- 宋磊 ²⁵⁴⁶	宋磊 2546		宋磊 2546
宋磊 2546	宋磊 2546		宋磊 2546	灾 藉 25 ⁴⁶		宋磊 2546	
FlowState	Bits	Area	-546	Description	宋魏 ²⁵⁴⁶	-746	宋磊 ²⁵⁴⁶
RPN	32	[31:0]		预期接收的RPN			

示例表项	Ī			动作	说明
(7001::00	001) (255)			If NACK Set Outport Mac Goto Reliability_Send	本质上做的是链路层工 作,应在网络层处理之 前。
				Else If pkt.RPN < flow.RPN	当出现pkt.RPN > flow.RPN时, <u>在接收侧</u>
				Goto Dispatch Table Else if pkt.RPN == flow.RPN flow.RPN++	流水线Deparser制造 NACK。
				Goto Dispatch Table Else	宋慕 2546 宋慕 2546
				Set DropStartRPN flow.RPN	宋惠 25 ⁴⁶ 宋惠 25 ⁴⁶ 宋惠 25 ⁴⁶
				Set DropEndRPN pkt.RPN-1	宋朝 2546
				flow.RPN = pkt.RPN+1 Goto Dispatch Table	宋朝 2546 宋朝 2546 宋朝 2546 宋朝 2546
(Defaul	lt)	宋磊 2546	宋磊 2546	PKTIN 95 III. 2546	以前是Goto Dispatch
					Table,经过与韩锐讨 论,现阶段改为PKTIN

2.Dispatch分发表

Dispatch MAU	(TCAM,	32 entries	宋語 2540			
Field		Bits	Maska ble	Option al	Description 98 3545	
nextHeader		8 宋慕2546	Yes	No 2546	IPv6首个Nextheader(暂未使用)	6
IRA	宋磊 2546	8	Yes	No	IDP的IRA字段。	宋磊 2546
SEAID.type	宋颢 25 ⁴⁶	8 宋孫 2546	Yes	No 7546	IDP的SEAID.type字段,注意这里合并字段,并注意顺序。在分离组播流量、 类型时被用到。	
CacheHop		4	Yes	No	IDP的IRA参数3。是一个递减的跳数值, 存包是否执行随路缓存操作。	用于确认缓
Inport.type	宋磊 2546	2 柴雅 2546	Yes	No 938 2546	入端口类型。 type[1:0]=01标识host端	·6 宋磊 2546
					type[1:0]=10标识mac端 type[1:0]=11标识其他端口,如pktout	
Local 97 88 2546		1 宋慕2546	Yes	No 32546	是不是发给本机的包	
磊 2546	宋磊 2546		宋磊 2546		宋惠 25 ⁴⁶ 宋惠 25 ⁴⁶	宋磊 2546
ActionData		Bits 2546	Area	宋磊 2546	Description (2007) 2007	6
NextTable	宋磊 2546	5	[4:0]		完第 25 ^{AG} 完第 25 ^{AG}	宋磊 2546
action 97.86 25.46	宋磊 2546	3 光觀2546	[7:5]	宋磊 2546	000表示cache send to AE; 001 表示go 010表示 goto OFIB1,同时hop - 1; 013	

示例表项 ************************************	动作 東東 2546	说明
(0x80,0xff)(0x00,0x00)(0x0,0x0)(0x0,0x0)	Goto Stealth Table	隐匿 001
(0x40,0xff)(0x00,0x00)(0x0,0x0)(0x0,0x0)	Goto Multipath Table	多路径 001
(0x20,0xff)(0x10,0xff)(0x0,0x0)(0x2,0xf)	Set Outport.type HOST (toAE)	缓存请求 000
(0x20,0xff)(0x10,0xff)(0x0,0x0)(0x1,0xf)	Goto OFIB1	缓存请求 001
(0x20,0xff)(0x01,0xff)(0x0,0xf)(0x0,0x0)	Set Outport.type HOST (toAE)	缓存数据 000
原 2546 实語 2546	灾 磊 2546	·慕2546

(0x20,0xff)(0x01,0xff)(0x0,0x0)(0x0,0x0)	Cache HOP -1	缓存数据 010
宋磊 ^{25A6} 宋磊 ^{25A6}	Goto OFIB1	宋器 2546
(0x00,0x00)(0x21,0xff)(0x0,0x0)(0x0,0x0)	Goto Multicast1 Table	组播 001
(Default)	PKTIN AS SEED 25AS	PKTIN 011

3.隐匿表

Stealth MAU (Group,R	andom Se	elect,128	entries)			
Field 9586	Bits	е	Option al	Description		
原2546 探報2546	- 実派 2546	_宋 惡 2546 -	- 宋慕 2546	字類 2546 字類 2546	宋磊 2546	宋磊 2546
ActionData	Bits	Area		Description		
DstIP 2546	128	[127:0]				
BaseAddr (1546)	8 _{宋第 2546}	[135:12 8]	宋磊 2546	此处为SrcAddr 的	BaseAddr	_{宋磊 2546} 宋磊 2546
NextTable	5 _{宋颢 2546}	[140:13 6]				
action	1	141		0: 随机游走; 1:	最后一跳	宋報 2546

示例表项		动作	说明	
		TTL-1 Set DstIP	随机游走	
		Set ModifySrcIP valid Goto SrcAddr Table BaseAddr	宋朝 2546	
		Set TTL 0 Goto ID Table	最后一跳	

(Default)		PKTIN	宋泰 2546	

4.组播Flow表

Multicast1 MAU	(EM, F	IASH, 409	6 entries ,	/ 1024 ent	ries for DPSS-200)			
Field	宋磊 2546	Bits	Maska ble	Option al	Description	宋颢 2546	±#. 2546	宋磊 2546
Dst ID	宋磊 2546	160	No _{宋第 2546}	No	目的ID。	宋颢 2546	Жет	灾磊 2546
宋磊 2546		宋磊 2546		宋磊 2546	宋磊 2546		宋磊 25 ⁴⁶	
ActionData		Bits	Area		Description			
PREID 92546		16 , 25,46	[15:0]		复制引擎ID			
NextTable		5	[20:16]		设置 Multicast2			

示例表项			动作			说明	
0xffeeddccbbaa 0000	99887766554	43322110000	Set PREID			匹配 务ID	组播数据包的组播服
宋磊 2546		_{宋磊 2546}	Goto Mult	icast2	宋磊 ²⁵⁴⁶		宋磊 2546
(Default)			PKTIN			宋翡 2546	

5.复制引擎

Field		Bits	Maska ble	Option al	Description			
宋磊 2546		宋磊 2546	_	宋磊 ²⁵⁴⁶	· · · · · · · · · · · · · · · · · · ·	表語 2546	宋磊 2546	
2546	宋磊 2546	_	来語 2546	_	東部 2546	宋部 2546		宋都 2546
宋籍 2546		宋 器 2546		宋器 25A6	灾	_{2話25} A6	宋器 2546	
ActionData		Bits	Area		Description			

Replicate Count	8	[7:0] 2546	复制份数	
BaseAddr	16 *** 2546	[23:8]	此处为Multicast2的BaseAddr	

示例表项			动作》為	说明 ************************************
宋語 2546 宋語 2546	完議 2546	宋語 2546 宋語 2546	Replicate Count Set BaseAddr	复制Count份,并为每一份设置Index,从Count-1到0
(Default)			PKTIN	

6.组播Packet修改索引表

Field	Bits	Maskab le	Option al	Description		
题 25 ⁴⁶ 安語 25 ⁴⁶	_	_ 宋磊 2546	-	宋颢 25 ⁴⁶ 宋颢 25 ⁴⁶		宋磊 2546
宋颢 2546	宋磊 2546		宋磊 2546	宋颢 25 ⁴⁶	宋磊 2546	
ActionData	Bits	Area		Description		宋磊 2546
BaseAddr	16 *** 2546	[15:0]	宋磊 ²⁵⁴⁶	Multicast3的base addr	宋磊 2546	
NextTable	5	[20:16]		均为Multicast3		宋語 2546

示例表项	动作	说明
	Goto Multicast3 Table BaseAddr	组播包需要逐跳改源IP
(Default)	PKTIN	金額 2546

7.组播Packet修改表

Multicast3 MAU	(Linear, Se	lect by BaseAdo	lr,1024)		
X280	K 200	X 200			

Field		Bits	Maskab	Option	Description			
宋磊 2546		宋磊 2546	le	al ^{宋縣 2546}	宋磊 2546		宋磊 2546	
_{宋磊} 2546	宋磊 2546	-	- 宋磊 ²⁵⁴⁶	-	- 宋磊 2546	宋磊 2546		宋磊 ²⁵⁴⁶
ActionData		Bits	Area		Description			
DstIP x 2546		128 12546	[127:0]					
BaseAddr	宋嘉 2546	8	[135:12		SrcAddr的base add	r 宋慕 2546		宋磊 2546
			8]					
NextTable		5	[140:13 6]		均为SrcAddr			

示例表项			动作	说明
			Set DstIP Set ModifySrcIP valid	组播包需要逐跳改源IP
			Goto SrcAddr Table BaseAddr	宋觀 2546
(Default)	宋磊 2546	宋磊 ²⁵	PKTIN	宋章 2546 宋籍 2546

8.多路径传输表

Multipath MAU (EM, C	AM 状态可	J编程,256)				
Field ## 2546	Bits M ^{25A6}	Maskabl e	Option al	Description			
MPT&Mask	8 架翻 25.46	No	No No No No No No No No No No No No No N	IDP的MPT字段(O 在的路径Mask取&	ptionA的前	8bit),与	本节点所
ActionData	Bits	Area	98.86 25.46	Description	宋磊 25 ⁴⁶	7688 2546	宋磊 2546
DIV_move_count	2 *** 2546	[1:0]	宋磊 2546	一般为可选路径数量	量以2为底的	对数取整	
NextTable	5	[6:2]		均为OFIB1			

Table Status		Bits	Count	宋磊 2546	Description	
SrvType	宋辞 2546	8	8	2546	8个可选路径的srvType号码	
Init Weight	_安 磊 2546	8	8	***************************************	8个路径的初始权重,0代表路径无效	6
宋籍 ²⁵⁴⁶		宋磊 25 ⁴⁶		宋磊 2546	宋藤 25A6 宋藤 25A6	
FlowState		Bits	Area		Description	
CurrentWeight		8*8	[63:0]		8组WRR的链表。链表节点当前权重	
NextIndex		8*8	[127:64]		8组WRR的链表,链表下一跳index	
CurrentIndex		8 宋藤 2546	[135:128	宋磊 2546	当前所选路径	
			, 宋磊 2546			

示例表项			动作		说明	
0x03			DIV >> 1 (WRR) Set SrvType Goto OFIB1		宋颢 2546	
(Default)	史慕 2546	宋器 2546	Goto OFIB1	宋器 2546	宋器 2546	中籍 2546

9.OFIB1

OFIB1 MAU (EM, HA	ASH, 1024)						
Field (#18) 2546	Bits	Maska ble	Option al	Description ************************************			
Ext Addr (1980)	128 - 2546	No	No 2546	IDP的Ext Addr字段。		宋磊 2546	
磊 25A6 宋磊 7	546	宋磊 2546		宋颢 2546	宋嘉 2546		宋磊 2546
ActionData	Bits	Area	宋磊 2546	Description		宋磊 2546	
BaseAddr	16	[15:0]		OFIB2的BaseAddr	宋磊 2546		宋磊 2546
NextTable NextTable	5 宋颢 2546	[20:16]	宋磊 2546	均为OFIB2	- 2546	宋磊 2546	- 2546

示例表项	动作	说明
2001::500	Goto OFIB2 BaseAddr 0	宋龍 2546
(Default)	PKTIN sea 15 ^{A6}	2546 実施2546

10.OFIB2

OFIB2 MAU (Lii	near, S	elect by B	aseAddr+o	ffset(mato	ch table status),8	192)		
Field		Bits	Maskab le	Option al	Description			
宋族 25 ⁴⁶ - - - - 	実孫 2546	宋龍 2546	- 宋慕 2546	宋第 2546	宋龍 25-46 宋龍 25-46	96 東高 2546	宋錄 2546	宗源 254
实焉 2546		宋磊 2546		宋磊 2546	宋語 25-6	16	宋磊 2546	
ActionData		Bits	Area		Description			
BaseAddr		16 _{**** 2546}	[15:0]	宋磊 2546	OFIB3的BaseAdo	lr		
NextTable		5	[20:16]		均为OFIB3			
				宋磊 2546				
Table Status	宋磊 2546	Bits	Count		Description	宋磊 2546		宋磊 254
SrvType		8 宋惠2546	8	宋磊 2546	8个可选路径的srv	/Type号码	宋磊 2546	
.≅. 2546	25.2546		- 2546		7546	2546		u== 254

示例表项	- 25.66	动作	说明
		Goto OFIB3 BaseAddr 0	宋藤 2546 宋藤 2546
(Default)		Goto OFIB3 BaseAddr LastOne	实现一个默认OFIB路由

11.0FIB3

OFIB3 MAU (Lin BaseAddr, 1024		elect by						
Field		Bits	Maskabl e	Option al	Description	宋磊 2546	宋颢 2546	宋磊 2546
震 25A6	宋磊2546	-	- 宋磊 2546	-	- 宋篡 ²⁵⁴⁶	宋磊 2546		宋磊 2546
ActionData		Bits	Area		Description			
DstIP 3546		128 12546	[127:0]	宋磊 2546	宋額 ²⁵⁴⁶		宋磊 2546	
BaseAddr	宋磊 2546	8 98 2546	[135:128	宋磊 2546	SrcAddr 的BaseAdd	dr ^{宋颢 2546}	灾虢 2546	宋磊 2546
NextTable	宋磊 2546		[140:136	Andre	均为SrcAddr	宋磊 2546	N	宋磊 2546
action	四票 2546	1	141	宋隸 25/16	0: 标准SEAWAN的C)FIB动作; 1:	逐跳改Src	IP 2546

示例表	项				动作	说明
					Set DstIP Set ModifySrcIP invalid Goto SrcAddr Table	标准SEAWAN的OFIB动作
_{宋磊 2546}	宋霞 2546	宋磊 2546	宋 慕 2546	宋磊 2546	Set DstIP Set ModifySrcIP valid	如果要逐跳改SrcIP,则 设置SrcAddr valid
(Defa	ult)	宋磊 2546	宋慕 ^{25Ao}	宋慕 2546	Goto SrcAddr Table BaseAddr PKTIN	宋惠 25 ^{A6} 宋惠 25 ^{A6}

12.源地址表

SrcAddr MAU (Linear, Select by BaseAddr,128) 每条表项上需要有Counter(uint64)									
Field		Bits	Maskabl e	Option	Description				
宋讀 2546		-	- 宋磊 2546	-	- 宋語 2546				

			宋慕 2546		宋磊 2546		
ActionData		Bits 2546	Area	宋磊 2546	Description	讀 2546	宋颢 2546
SrcIP	宋語 ²⁵⁴⁶	128	[127:0]		宋語 2546	宋慕 2546	宋誕 2546
BaseAddr	宋磊 2546	8	[135:12 8]	宋磊 2546	完 完課 2546	族 ²⁵⁴⁶ 宋颢 ²⁵⁴⁶	宋龍 2546 宋龍 2546
NextTable		5 宋慕 2546	[140:13	宋磊 2546	宋	磊 2546	宋磊 2 ⁵⁴⁶
京語 2546	宋磊 2546		6] 2546		宋磊 2546	宋語 2546	宋慕 2546
					灾		
FlowState		Bits	Area		Description		
BytesCounter		64 🕬 2546	[63:0]	宋磊 2546	每个地址的发	送流量,可通过Flo	owReq获取

示例表	项		动作	说明	
			BytesCounter += PktLen If 可靠传输DAT & local	宋郎 ^{25,46} 宋章 ^{25,46}	宋磊 2546
			Set RSIP	宋磊 2546	
				宋惠 2546	
			If 源IP修改	灾磊 2546	
			Set SrcIP	宋襄 2 ⁵⁴⁶	
			Goto Adjacency Table Else	欠 額 ²⁵⁴⁶	
			Goto FIB_HOST	突退 2546	
(Defa	ault)		Goto FIB_HOST	默认不改SrcIF	> 宋磊 2546

13.FIB HOST

FIB_HOST MAU (EM,	HASH, 102	24)		
Field	Bits	宋磊 2546	Description	

			Maska ble	Option al			
DstIP	宋磊 2546	128	No 2546	No	目的IP地址。	宋磊 ²⁵⁴⁶	宋磊 2546
ActionData		Bits	Area		Description		
BaseAddr		16 ** 25.46	[15:0]				
NextTable	宋磊 2546	5	[20:16]		宋磊 2546	宋磊 2546	宋磊 2546

示例表项	动作	说明
宋語 2546 宋語 2546	Goto Adjacency Table BaseAddr	宋朝 2546
(Default)	Goto FIB_LPM	查不到则去FIB_LPM

14.FIB LPM

FIB_LPM MAU	(TCAM,	LPM, 16)					
Field		Bits _{宋爾 2546}	Maska ble	Option al	Description		
DstIP	宋磊 2546	128	Yes	No	目的IP地址。	宋磊 2546	宋磊 2546
		宋磊 2546					
ActionData		Bits	Area 25.46		Description		
BaseAddr		16 ** 2546	[15:0]				
NextTable	宋磊 2546	5	[20:16]		宋磊 2546	宋磊 2546	宋磊 2546

示例表项		动作		類 20 ·	说明	
中 類 2546		Goto Adjace	ncy Table Ba	aseAddr m 2546		
(Default)		PKTIN		宋郡		

15.邻接表

Adjacency MAU (Linea	r,Select b	oy BaseAdd	r,1024 e	ntries)				
Field 98 25 26 26 26 25 26 26 25 26 26 25 26 26 25 26 26 25 26 26 25 26 26 25 26 26 26 26 26 26 26 26 26 26 26 26 26	Bits	Maskabl e	Option al	Description	n _{宋磊 2546}			
震 2546 宋磊 2546		· 宋磊 2546		· 宋磊 25 ⁴⁴		宋磊 2546		宋磊 2546
- 宋薨 25 ⁴⁶	宋磊 2546	_	- 宋磊 2546	-	宋磊 2546		宋磊 2546	
磊 2546 宋磊 ²⁵⁴⁶		宋磊 2546		宋磊 2546		宋磊 2546		宋磊 2546
ActionData	Bits	Area		Description	n _{宋慕 2546}			
OutPort	8	[7:0] 2546						
DstMAC 900 7546	48 🕫 2546	[55:8]						
SrcMAC	48	[103:56]		宋磊 2546		宋磊 2546		宋磊 2546
PppoeSessionID	16 ^{宋第 2546}	[119:104	宋磊 2546		宋磊 2546		宋磊 2546	
源 25A6 宋慕 25A6] 宋顯2546						
VlanID	12 2546	[131:120						
		, 宋磊 2546						
PPPoESessionIDValid	1 宋義 2546	[132]	_{宋磊 2546}		宋磊 2546		宋磊 2546	
VlanIDValid	1	[133]						

示例表	项 # 3546		动作	说明	
宋磊 2546			Set DstMAC	宋壽 2546	宋磊 2546
			Set SrcMAC		
宋磊 2546			TTL-1 宋新2546	宋慕 2546	
			If Vlan vaild		
			Set VlanID	宋翡 2546	
			Set Output Port		
			If SessionID valid		
				宋慕 2546	

宋颢 ²⁵⁴⁶		Set SessionID		2546	宋磊 2546
(Default)	_宋 磊 25 ⁴⁶	PKTIN	宋磊 2 ⁵⁴⁶	宋磊 2546	

16.ID解析表

ID MAU (EM, HA	SH,8	M)					
Field 95/8 25/46		Bits 12546	Maskabl e	Option al	Description	₂₅ 46 架 宋 第 2546	第2546 宋第2546
Dst ID		160	No	No	目的ID。	2546 宋年	· 第2546
震 2546	宋磊 2546		宋磊 ²⁵⁴⁶		宋磊 2546	宋慕 2546	宋磊 2546
ActionData		Bits 18 2546	Area	宋磊 2546	Description	2546 宋3	嘉 25 ⁴⁶
NACount	宋磊 2546	3	[2:0] 2546		宋磊 2546	宋磊 2546	宋磊 2546
Mode 925A5		3 *** 2546	[5:3]	宋磊 2546	宋磊	2546 宋記	嘉 2546
DstIP	宋磊 2546	128*6	[773:6]		宋器 2546	宋器 2546	宋磊 2546
BaseAddr	宋磊 2546	8	[781:774	宋磊 2546	宋颢 2546	2546 宋 宋 第 2546	集25 ⁴⁶ 宋颢25 ⁴⁶
NextTable		5 宋慕 2546	[786:782	宋磊 2546	均为 SrcAddr	2546 宋年	£ 2546
] 宋磊 2546				

示例表项		动作	说明	月 宋顯 2546
宋觀 2546 宋觀 2546		Set DsIP Set ModifySrcIP valid Goto SrcAddr Table BaseAddr		匿查询完后,造好边带 号通过PKTOUT回到主 k线
(Default)		PKTIN	宋霜 2546	

17.高可靠传输发侧表

Reliability_Send	MAU (EM, HASH	l,状态可统	编程, 1024) 应在多队列模块之成	宋磊 2546		
Field 95 25 AS		Bits 125A6	Maska ble	Option al	Description Page 15-80			
磊 2546	宋磊 2546		宋慕 2546	u t	宋磊 2546	宋磊 2546		宋磊 2546
RSIP 9784 2546		128	No	No 2546	SEANet传输层的RSI	P。		
DstIP		128	No	No	目的IP地址。			
FlowState	宋磊 2546	Bits	Area		Description	宋磊 2546		宋磊 2546
RPN 92545		32 ^{7/8 2546}	[31:0]	宋磊 2546	流的RPN,用于修改	包的RPN	宋磊 2546	
- 16	- 46		-16		- 16	- 16		- + 6

示例表	项				动作	说明	
(7001::0001) (7001::0002)					If DAT	此表应在多队列模块之	
					Set pkt.RPN by flow.RPN	后,使得RPN值正确	
宋磊 2546					flow.RPN++	看 25A6 宋慕 25A6	
					Set PKT_PROPERTY 可靠命中	在Deparser中,对于发	
宋磊 2546					Set FlowIndex	向下游的DAT报文(非过 路报文),	
7,7					Else If NACK from MAC	Reliability_Send MAU	
					Set PKT_PROPERTY 可靠命中	用RSIP和DIP匹配,DAT	
来磊 2546					Set FlowIndex	报文同时发向MAC和可靠 发送缓存模块;对于来自	
						上游的NACK报文,	
宋磊 2546						Reliability_Send MAU用 DstIP和SrcIP匹配,此	
						NACK报文只发向可靠发	
宋磊 2546						送缓存模块; 其他正常转发。	
						宋颢 2546	
(Defa	ault)	宋磊 2546		宋磊 2546	Set PKT_PROPERTY 可靠未命中	景 2546 宋縣 2546	

5. Parser默认动作

5.1 高可靠接收侧流水线Parser默认动作

对于IPv6包: 进local表

对于非IPv6包:不做处理跳过本流水线

5.2 IDP流水线Parser默认动作

If Ourport 不为8b'0 (已指定出口) 跳过IDP流水线。

Else If Tid值不为0xff

设置对应的TableMask

If (local && (Protocol & ProPktinCsr != 0))

PKTIN

非IDP包,跳过IDP流水线,去IP转发流水线

IDP包:

if inport来自Host,SET local

NACK包: 跳过IDP流水线,去IP转发流水线

NACK-Reply包: local 丢(置error); 非local 转(跳过IDP流水线,去IP转发流水线)

default: Goto Dispatch

非PKTIN的error包,跳过流水线处理(error包:IPv6长度不对,IDP字段不对,local的NACK-Reply)

Deparser配套逻辑: 非PKTIN的Error包, Drop

5.3 IP转发流水线Parser默认动作

来自ctl的包不能再被PKTIN,drop

If Ourport 不为8b'0 (已指定出口)

跳过IP转发流水线。

Else If Tid值不为0xff

设置对应的TableMask。如果Tid<本流水线的表号,从FIB_HOST处理

If (IDP||SCMP)

从FIB HOST处理

Else

端口收发(mac转给host,host转给mac)

End

5.4 高可靠发送侧流水线Parser默认动作

对于idp包:

高可靠DAT传输包: local 进高可靠传输发侧表,置vaild; 非local, 跳过本流水线,不置valid

NACK包: local 置valid; 非 local 跳过本流水线,不置valid。

NACK-Reply包:跳过本流水线,不置valid。

default: 跳过本流水线,不置valid。

对于非idp包:不做处理,跳过本流水线。

6. 哈希矩阵

6.1流表和哈希矩阵的对应关系

6.2key位数等于128位

```
\{0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
```

```
uint8_t hash128_2[128][11]={
\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
```

```
\{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
```

uint8_t hash128_3[128][11]={ $\{0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},$ $\{0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},\$ $\{0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},$ $\{0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},$ $\{0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},$ $\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},$ $\{0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},$ $\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},$

```
\{0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
}; 25
```

```
\{0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
};
```

6.3key位数等于136位

```
hash136_4[136][9]={

{0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x1},

{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0},

{0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1},

{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x0},

{0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0},
```

```
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x1\},
\{0x0,0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1\},
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x0\},\
\{0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x0\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x0\},\
\{0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x0\},
\{0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x0\},\
\{0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1\},
\{0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x1\},
```

```
\{0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0\},\
\{0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x0\},\
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x0\},
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x0\},\
\{0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x0\},\
\{0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1\},
```

```
\{0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x0\},\
\{0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0\},\
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1\},
\{0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x1\},
\{0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x0\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0\},\
```

```
\{0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x0\},\
\{0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x0\},\
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x0\},
\{0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x0\},
\{0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x1\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0\},\
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x0\},\
\{0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
```

```
{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0},
{0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x1},
{0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0},
{0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x1},
{0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0},
{0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x0},
{0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x0},
{0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x0},
};
```

6.4key位数等于160位

```
uint8_t hash160_1[160][11]={
\{0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
};
```

```
\{0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
};
```

```
\{0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
```

```
\{0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
```

```
\{0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},\
\{0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
```

```
\{0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
```

```
uint8_t hash160_4[160][11]={
\{0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
```

```
\{0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
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\{0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},\
\{0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},
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\{0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
```

```
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
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\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
```

6.5key位数等于256位

```
uint8 t hash256 1[256][9]={
\{0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x1,0x1\},
\{0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},\
\{0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x0\}
\{0x0,0x0,0x0,0x0,0x1,0x1,0x1,0x0,0x0\},\
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x0,0x0,0x1,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x1\},
\{0x1,0x1,0x1,0x0,0x1,0x1,0x0,0x1,0x0\},
\{0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x1,0x0\},
\{0x1,0x1,0x1,0x1,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x0,0x0\},
```

```
\{0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0\},\
\{0x0,0x1,0x0,0x1,0x1,0x1,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x0\},\
\{0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0\},
\{0x1,0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x0,0x1\},
\{0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x0\},\
\{0x1,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x1\},
\{0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
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\{0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x1,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x1,0x0\},
\{0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},\
\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x1\},
\{0x0,0x0,0x0,0x1,0x1,0x1,0x1,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
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\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x0,0x1\},
```

```
\{0x1,0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x1,0x0,0x0,0x1,0x0\},\
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\{0x0,0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x0,0x1,0x0,0x1,0x0,0x1,0x0\},\
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\{0x1,0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x0\},
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\{0x0,0x1,0x1,0x0,0x0,0x0,0x1,0x0,0x1\},
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\{0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
```

```
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\{0x1,0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1\},
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\{0x0,0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x0\},
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\{0x1,0x0,0x0,0x1,0x1,0x0,0x0,0x1,0x1\},
\{0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1,0x1\},
```

```
\{0x1,0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x1\},
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\{0x1,0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x0\},\
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\{0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x1,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x1\},
\{0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x1,0x0\},
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\{0x0,0x0,0x0,0x0,0x0,0x1,0x0,0x0,0x1\},
\{0x0,0x1,0x1,0x1,0x0,0x0,0x1,0x1,0x1\},
```

```
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x1,0x0\},\
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\{0x1,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x0,0x1,0x0,0x0,0x0,0x0,0x0,0x1\},
```

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```

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};
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\{0x1,0x1,0x0,0x1,0x1,0x1,0x1,0x0,0x0\},\
\{0x1,0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x1\},
\{0x1,0x0,0x1,0x1,0x0,0x0,0x1,0x1,0x0\},\
\{0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x0,0x0,0x1,0x0,0x1,0x0\},
\{0x0,0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x0,0x1,0x1,0x1\},
\{0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x0,0x0\},\
\{0x0,0x1,0x0,0x0,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x1,0x0,0x0,0x0,0x1,0x0,0x1,0x1\},
\{0x0,0x1,0x1,0x0,0x0,0x0,0x0,0x0,0x0,0x0\},
\{0x0,0x1,0x0,0x0,0x1,0x1,0x1,0x1,0x0\},
\{0x0,0x1,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
\{0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x1,0x0\},
\{0x0,0x0,0x0,0x1,0x1,0x0,0x1,0x1,0x1\},
```

```
\{0x0,0x0,0x1,0x0,0x1,0x0,0x0,0x1,0x0\},
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\{0x0,0x1,0x1,0x1,0x0,0x0,0x0,0x0,0x1\},
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\{0x1,0x1,0x1,0x0,0x1,0x0,0x0,0x0,0x0\}
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\{0x0,0x0,0x1,0x1,0x1,0x1,0x0,0x1,0x0\},\
\{0x0,0x0,0x0,0x1,0x0,0x1,0x1,0x0,0x1\},
};
```